

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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Large Vertical Shear.

The vertical shear shown herewith was built by Cavett & McKnight, Pittsburgh, for the Siemens-Anderson Steel Company. The weight is 72 tons. It was designed to cut hot steel blooms 8 x 8 inches, or plates 36 x 4 inches, and has cut blooms 7 x 11 inches with ease. The height is 16 feet, the width 9 feet 6 inches, and the roller table is 22 feet long. The crank-shaft is driven by a spur wheel, running loose, and a sliding clutch and feather, operated by an independent steam or hydraulic cylinder under the frame. The largest gear wheel weighs over 4 tons. The eccentric, which is of steel and keyed to the shaft, weighs 1600 pounds. The uprights of the shear are in four pieces, and shrunk together with fourteen links of 2-inch square wrought iron, each pair forming a side on the bed-plate, and bolted with twelve T-head bolts. The main journal boxes are of cast iron, filled with Babbitt's metal, with 12-inch diameter of journal and 10-inch bearing. There is no strain on the box, as it only has to carry the weight of the driving-wheel, shaft, pitman and cutting jaw. The cap, which weighs 2650 pounds, is planed out, and a solid brass box is fitted in, which takes the work. The work on the caps is taken by four steel bolts 4 1/2 inches in diameter, with nuts and lock-nuts running through the entire length of the column, which is bored to receive them. The lower knife holder is so arranged that a breaker can be set in in case of accident of any kind, such as a cold ingot; in the latter case the breaker will give way and allow the bottom knife to drop clear of the stroke of the cutting jaw. The main shaft is 12 inches in diameter, of steel, with steel eccentric 12-inch face, and is bored, key-seated and shrunk on shaft. The yoke is of cast iron, bored to suit eccentric; the sliding head is bored to receive the lower end of yoke, which has a neat fit so as to take the work on the end, instead of on the pin. A 4-inch steel pin running through end of pitman lifts the jaw when on the ascent, and the toggle receives the shearing strain. The main wheel is 3-foot diameter, 12-inch face, 5-inch pitch, and runs loose on main shaft, with a clutch face on the hub, recessed next to the shaft to receive a wrought-iron collar to keep it up to back bearings. The wheel is continually in motion while the engine is running. The clutch slides on two feather keys in end of shaft, and is thrown in or out by a hydraulic or steam cylinder on lower end of uprights. The main spur is driven by a 24-inch pinion, on 9-inch steel countershaft, which is driven by an 8-foot spur wheel, 9-inch face, which spur is driven by a 24-inch pinion, 9-inch face, on the engine shaft. The rollers in the table are handled by a Mason clutch, the lever of which stands by the hydraulic lever, and both are worked by one man. When the knife is raised up the table is thrown in motion, the ingot is run in the proper distance, the table is stopped, and the clutch thrown on; the main shaft makes one revolution, and is then stopped until the bloom is run in for another cut, or the bloom can be run back, as desired.

The Mason clutch is on the center roller, and is driven by open and crossed belts from the fly-wheel shaft. The blades are 3 inches thick, 38 inches long and 8 inches broad, and can be made in two lengths, so they are much easier handled in dressing; they are tempered to a dark straw. The whole is driven by an 18 x 18 inch vertical engine.

The design of this tool reflects great credit upon the builders, who are now constructing another tool, from the same drawings, for the Pittsburgh Steel Casting Co.

A New Coke Oven.

A new and improved coke oven has recently been brought out by Mr. W. G. Merriman, of Pittsburgh, Pa., which, if it can do all that is claimed for it, will certainly be an important addition to the plant of any coke operator. From the engraving here given, it will be seen that the oven differs materially in appearance from either the beehive or the Belgian. It is built of brick, and is strongly bound by iron bands, which, it is claimed, add greatly to its strength and prevent the formation of cracks, so common in the beehive oven. This would naturally be an important element in reducing the cost of repairs. The inside measurement of the oven is 12 feet by 6 feet, being 5 feet high. The side walls are vertical until they reach a point 3 1/2 feet from the base, from which point the arch is sprung that forms the top. The charging hole, as will be seen, is in the middle of the top, and the chimney, placed at the rear end, is claimed to considerably hasten the process of coking, since the gases arising from the coal are immediately drawn off. The front of the oven is closed by a door, which is also a considerable improvement, as by its use a uniform heat may be maintained, and the labor of bricking up the front every time a charge is drawn dispensed with. Owing to the simple construction of the oven, its average cost is very low. The chief advantage claimed for it, however, lies in the fact that it can be very readily drawn. In the beehive oven, on the contrary, the brickwork closing the front must first be removed, the fire almost extinguished and the mass broken up and raked out. These several operations consume some time, and the oven, moreover, when ready for the second charge, is quite cold, thus involving a considerable

waste of heat. The process of drawing Mr. Merriman's oven is much more easily accomplished, the whole mass of coke being drawn at once. This is done by means of a drag, with a cross-piece at the end, which is placed on the bottom of the oven before charging, and which extends from one end to the other. When the oven is ready to be drawn, the door is opened, the water is applied, the coke is crystallized and then a chain is attached to the drag, and with the aid of a small engine the charge is immediately withdrawn in a mass. As is now the case, one man draws about 4 ovens,

a trace of metallic iron, a great preponderance of ferrous over ferric oxide, and a comparatively large proportion of chlorine in combination with iron and manganese.

Steel as a Structural Material.

At a recent meeting of the Institution of Civil Engineers, England, Mr. Ewing Matheson read a paper on "Steel for Structures," in which the present position occupied by steel, as compared with iron, as a material of construction, was dwelt upon at some

rules in England, while the maximum strain allowed on iron is 5 tons per square inch of sectional area, a strain of only 6 1/2 tons is allowed on steel, and, in designing bridges, the engineer is, consequently, unable to take full advantage of the superior qualities of the latter material. For various reasons, the thickness of parts in a steel structure cannot be reduced in proportion to those of an iron structure, and bridges of moderate span cannot be made so cheaply of steel as of iron, so long as the cost of the material exceeded that of iron in a proportion equal to that of the greater strains permitted. A

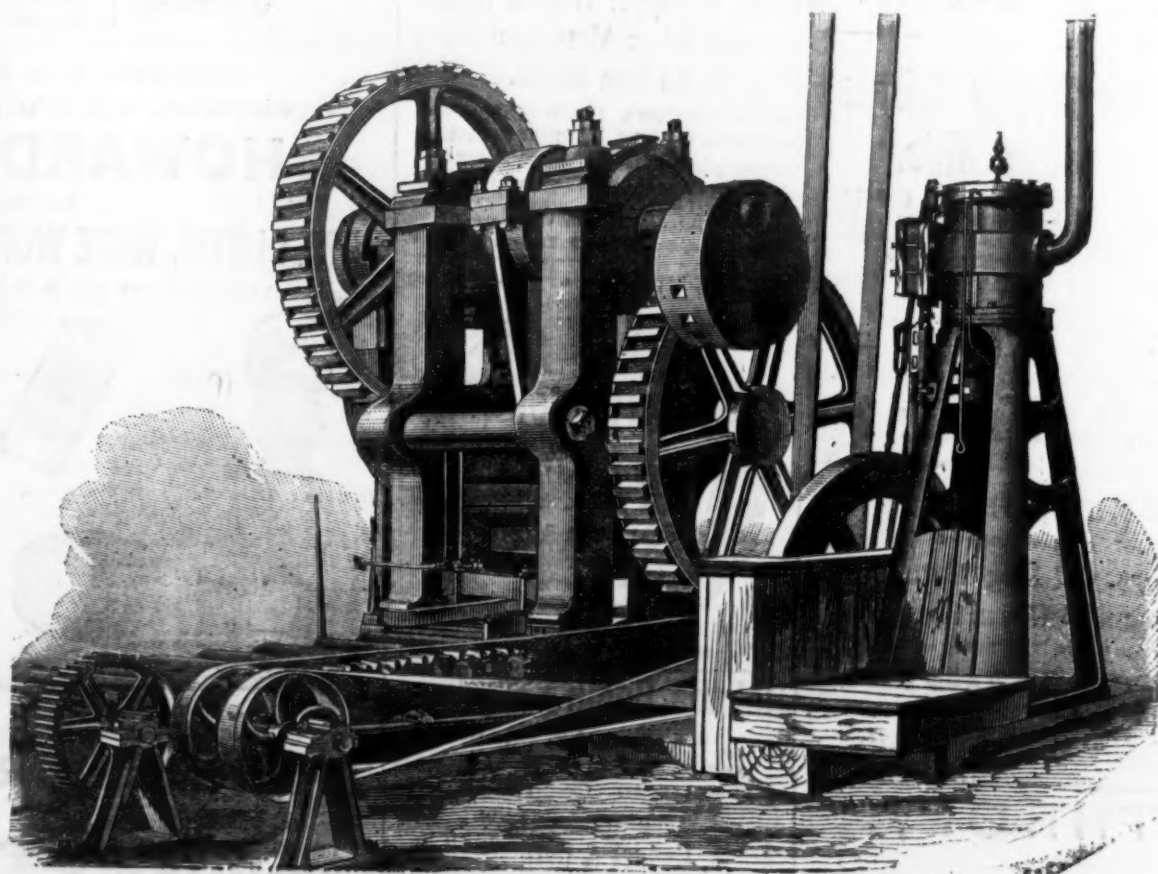
An authoritative brand or hall-mark seemed necessary, if steel was to be universally accepted, and the author suggested that some mark should be adopted, as denoting quality and kind, the addition of the particular trade-mark of each maker serving as a warranty. While a certain minimum of strength and ductility might be demanded, the present limits to the maximum straining should be amended, so that, instead of 6 1/2 tons per square inch, 8 tons might be allowed—an increase amply justified by the experience acquired during the last few years. If this was done, the greater demand would almost certainly have the effect of bringing the price nearer to that of iron, as had been the case with rails. The author set forth the present rules of the English Admiralty and Lloyd's in regard to steel for ships, and directed attention to the different rules of the French Admiralty, to exemplify the alterations which he proposed. As it was by means of a Royal Commission that the present strains on steel were permitted in England, it was time that another commission should be appointed to inquire into the facts more recently acquired, and to grant more liberal rules for the future. With an extension of the present limit of 6 1/2 tons, there would be such a demand as would lead to improvements in the manufacture, increase the output, and reduce the price of steel. The whole calculation would then be altered, and when steel might not only be worked to 8 tons strain per square inch, but the difference in price over iron was less than it was now with 6 1/2 tons, then, but not till then, would the era of steel structures have arrived.

Elementary Science in Schools.

In his annual address before the California Academy of Sciences, the president, Prof. Davidson, dwelt upon the advantages of the introduction of elementary science in the public-school system, and upon the formation of schools of trade, art and commerce. He believed that the present school system had spoiled tens of thousands of artisans, but in this respect it has in a measure only repeated the experience of other countries. To state its results mildly, it may be said to have created a disposition in the pupils to avoid those occupations which demand manual labor, and seek those easy berths where some one else must do the work. It creates a false standard of manly merit. Whoever has had a varied experience with young men grown up from the ordinary public schools, will be astonished at their lack of knowledge of the fundamental principles which underlie their workmanship. They have, in general, an amount of undigested, incoherent material which their teachers have christened knowledge, and which their own experience considers applicable for any and every pursuit. One of the commonest shortcomings of the young throughout the country is their inability to draw upon paper the simplest objects. Very few of them could lay down a map of the roads with which they are most familiar, or make a sketch of the plainest machine of the day, and much less convey upon paper any idea which looks to an improvement or an invention in machinery or construction. Prof. Davidson felt safe in saying from his experience that not one person in a hundred from the public schools can give an off-hand drawing of any plain object with an approachable degree of accuracy as to relative dimensions and perspective. This he did not think was the fault of the pupils, but rather the inherent weakness of the system. He took it as an evidence that this country is not doing its duty to its boys. It is not necessary to cram the young men, who are to build up the industrial supremacy of this country, with foreign languages, which in a few years must be pressed aside before the irresistible progress of the English-speaking races. It is a thousand times better that the boy who is to honestly earn his livelihood as an artisan should be a fair draftsman than a fair musician. The speaker praised the musical faculty, which he believed, wherever it existed, should be cultivated, but, he said, "do not spoil a good carpenter to make an indifferent musician." The classics, music and the fine arts have their high places and their harmonizing functions in modern civilization; so, too, has the bridge builder, the miner, the engineer and the contractor. Each year the demand for skilled labor increases, and the difficulties of the problem of education multiply. The deficiencies in the present system cannot be corrected at once. Time is required to mold and develop a proper system of trade and art schools.

A unique specimen of the metal-working art has just been produced by the firm of Beskow, of Jönköping, Sweden. It is a statesman's portfolio, with steel covers, on which are engraved the initials and crest of a Spanish nobleman, while the reverse is adorned with etchings representing incidents of the Scandinavian Saga. It is said to be a beautiful specimen of what may be accomplished in this art, for which the Spaniards were once famous, but which appears to have degenerated of late years.

The Hudson River Tunnel has now reached a distance beneath the river of 830 feet in the north tunnel, and in the south tunnel 700 feet. The work is progressing at the rate of 4 1/2 feet per day.

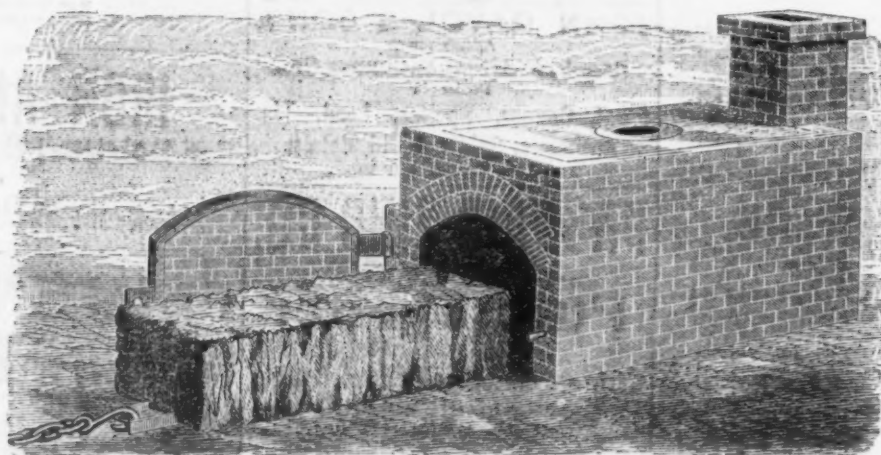


LARGE VERTICAL SHEAR, BUILT BY CAVETT & MCKNIGHT, PITTSBURGH.

where with Mr. Merriman's oven he claims that one man can draw 20, and that with less labor. The oven is also stated to work extremely well on coal dust and small coal. As regards the output, the inventor states that his oven has made and will make 150 bushels of coke in 48 hours, and with much less labor and expense than can be done with any other oven. Mr. Merriman has made several experiments with these ovens

length, considerable attention being, moreover, given to the question why, while steel was rapidly superseding iron for ships and boilers, it was so seldom used in bridge construction! Steel possesses the important advantage of a strength one and a half to thrice that of iron, besides being much more elastic and ductile, and, owing to the method of manufacture, plates and bars of the usual kind can be made of steel in much larger

saving in weight of only 12 per cent. could be obtained in a bridge having a span of 50 feet, while a saving of 30 per cent. could be obtained in a bridge of 500 feet span. With the present prices of iron and steel there would be a loss by using steel in the small span and a gain by using it in the large span. But while there might be no immediate pecuniary saving by using steel, there was, owing to the very moderate strains



MERRIMAN'S IMPROVEMENT IN COKE OVENS.

in England, and the results have been satisfactory in every instance.

Some interesting statements were made in a paper "On the Analysis of a Piece of Oxidized Iron from the Condenser of H. M. S. Spartan," recently read before the Chemical Society, England. The specimen consisted of a brownish substance with many shining black particles, and resembled a piece of rusty gray pig iron. Its specific gravity was 2.63, and it was very friable. Details are given of the quantitative analysis, which yielded the following result: Insoluble residue, 31.84—carbon, 12.57; hydrogen, 0.24; incombustible, 17.54—SiO₂, 16.98; FeO₂, 0.12; Al₂O₃, 0.06; CaO, 0.15; MgO, 0.02. Cupric oxide, 0.38; ferric oxide, 3.21; ferrous oxide, 42.33; alumina, 0.16; manganese oxide, 1.02; cobalt oxide, 0.05; sodium oxide, 0.11; phosphoric acid, 5.24; sulphuric acid, 0.31; chlorine, 2.08; vanadic acid, 0.11; water, 16.71. Total, 102.55. The points of interest are that there was not

pieces than is possible with iron, thus avoiding the numerous joints which smaller pieces involve. It was stated that the special treatment necessary for steel could soon be learned by workmen accustomed to iron, and present tools and machinery could be used for either metal. In regard to wasting by rust, sufficient time had hardly elapsed to prove positively the durability of steel as compared with iron, but at present it appeared as if the difference, if any, was in favor of steel. Because of its greater strength, structures equal to iron could be made of less weight in steel; and in regard to ships, this saving allowed a corresponding increase in cargo-carrying capacity, or a reduced immersion. In boilers, plates, whether of steel or of iron, could not conveniently be of more than a certain thickness, and the working pressure was limited accordingly; but the superior strength of steel permitted a working pressure of steam one-third greater than in boilers of iron, thus allowing a saving in the space occupied for a given power, and greater economy in fuel. According to existing

permitted on this new material, a much greater margin of safety than in iron. Hence the question arose whether, even although the cost of steel bridges of moderate span might be greater than that of iron bridges, they should not be preferred, and their use enforced, because, if measured by units of strength and durability, as well as of money, they would, eventually, be cheaper. There are several means by which the use of steel might be extended. The proper treatment of steel has now been thoroughly investigated, and the circumstances under which the metal is damaged, by punching holes and other manipulation, are well understood. But there we also need some ready means of verifying quality, this being far more necessary in steel than in iron, because in the latter the range within which strength might vary is only one-sixth, whereas steel has a much wider range. Again, the mere fact that iron had been rolled into shape ensured a certain minimum of quality, while if steel chanced to be bad it might be one-half weaker than was wanted.

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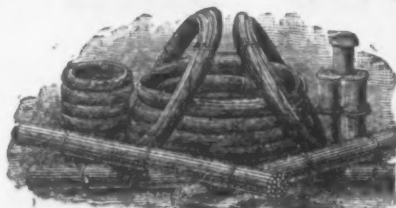
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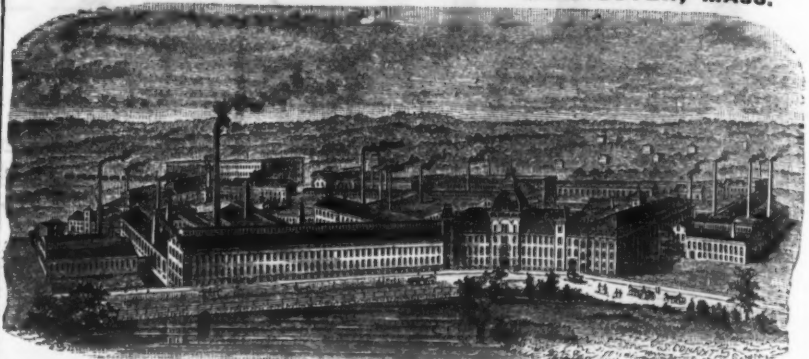
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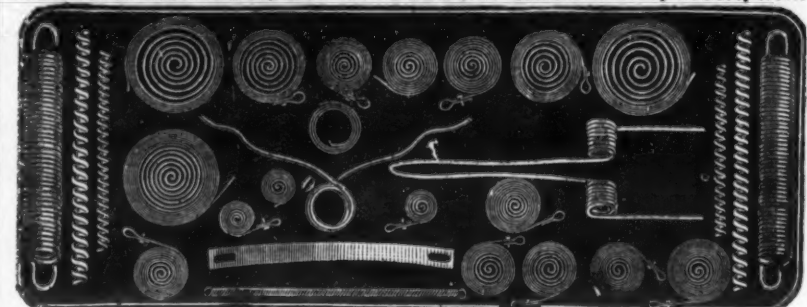
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Band Saw Setting Machine.

Messrs. G. W. Amesbury & Co., of 3101 Chestnut street, Philadelphia, are introducing the band-saw setting machine represented herewith. In its design and construction this device embodies new principles, and is said to possess all the good features of hand work in combination with the speed and regularity of machine work. To properly set the teeth of a band saw, the blade should be clamped firmly as in a vise. To hold the saw in position by passing it through slots which must be open enough to admit the easy passage of all the thickest parts is not sufficient, because the blade will yield back and forth with the action of the dies against the teeth, and as the blade varies in thickness, so will the set vary in the teeth. To produce an even set the pressure on each tooth should be the same. The action of an arm in moving a lever back and forth is spasmodic, and the force of the blow or pressure on the teeth varies. Accordingly a circular motion has been found to be most desirable for this purpose. The use of a fly-wheel insures even and uniform work at all portions of the stroke. These features are embodied in the machine we illustrate. It is arranged to work by an easy, uniform crank motion, and when the tooth to be set is fed into position, the blade is firmly locked between the steel jaws of a vise, and remains

field. Messrs. D. June & Co., of Fremont, Ohio, send us a descriptive pamphlet of the fire-proof "Champion" agricultural engine manufactured by them. The term fire-proof applied to a steam engine, may, at first thought, appear singular, but when it is remembered that one of the prime conditions in using an engine about a farm and close to barns and hay stacks, is security from fire, the appropriateness of this expression will be seen. The fire-proof feature of this engine is the patent spark-arrester, with which its smoke-stack is provided. The general features of this spark-arrester may be described. A reservoir of water is maintained in the base. An inverted cone interrupts direct passage of the smoke and forces it over partitions, properly placed in such a way that the sparks thrown out from the fire must fall into the water just mentioned. Draft is facilitated by steam from the exhaust pipe, which is passed immediately under this inverted cone through a contracted nozzle. The reservoir is supplied with water by an induction pipe, and, by means of an overflow, is kept at the proper point. By means of this overflow the wet ashes, sparks, &c., are washed to the ground. In addition to the sparks being thrown down into the water, as we have described, a double grating is placed above the water, which is kept constantly wet from the agitated water and steam, and arrests all light

LIGHT HOISTING MACHINERY.

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No. 7.

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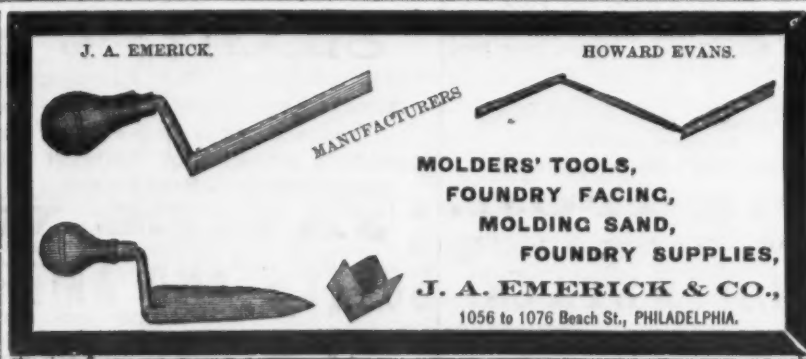
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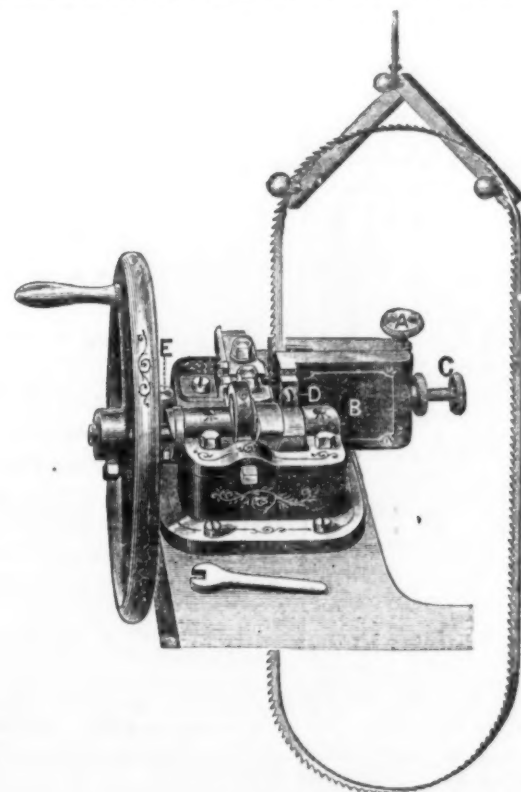
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SOLE AGENTS FOR THE UNITED STATES:
WOLTMAN & MICKERTS, ST. LOUIS, MO.



Amesbury Band Saw Setting Machine.

immovable while the tooth is set to any degree required. As the crank goes forward the blade is released, when the next tooth is fed up to the dies, the blade again locked in the vise, and this tooth set in the opposite direction. All these movements are automatic, and can be carried on at a speed of 300 teeth per minute. The feeder picks up only the tooth that is to be set; consequently each tooth is fed to its proper position, regardless of its irregularity. In using the machine the band saw is simply hung up on a wooden bracket, as shown in the engraving, and the lower part left pendant near the floor.

CATALOGUES.

MALLEABLE IRON.

The Queen City Malleable Iron Co., of Cincinnati, Ohio, have sent us a copy of their illustrated catalogue for 1882, a pamphlet of nearly fifty pages, neatly gotten up and containing a concise description of the goods manufactured by the company. It also contains a description of the improved annealing furnace used by this company, illustrations of which have already appeared in *The Iron Age*. In the preface addressed to the trade, the company say: "Our No. 1 welding malleables are forgable and weldable, and have qualities not obtained by any other manufacturer in the United States for tenacity and ductility. This iron can be forged and drawn out under the hammer as fine as the best Swedish or charcoal wrought iron, showing extraordinary softness and ductility. It can be welded, without the use of borax or other welding flux, to steel or wrought iron, or on to malleable iron, and is, therefore, especially adapted for shears or any other kind of edge tools."

STEAM ENGINES, HOISTING ENGINES, ETC.

From Messrs. Beckett & McDowell, of Arlington, New Jersey, with New York office and salesroom at 120 Liberty street, we have received their catalogue dated March, 1882, of steam engines, hoisting engines, mining and milling machinery. The works of this firm are located at Arlington, N. J., a suburb of Newark, and about six miles from the City Hall, New York. In order to make their patrons thoroughly familiar with the location of their factory, their facilities for shipment, &c., the fourth page of the cover of this catalogue is devoted to a map of New York and vicinity. Describing their factory the firm state that their drawing offices, pattern shop, foundry, blacksmith and machine shops, are all fitted up with the best and most improved tools and facilities. All the work produced is finished to United States standard gauges, enabling the concern to duplicate any details of machinery with accuracy and dispatch. The designs in the catalogue embrace stationary engines, hoisting engines, mine appliances, rock crushers, pans and settlers, revolving roasting furnaces and dryers, and mill and pumping machinery.

AGRICULTURAL ENGINES.

Agricultural engines are attracting the attention of manufacturers at the present time, and many candidates for favor are in the

sparks which may not reach the water. This spark-arrester has been in use since March, 1875, and we learn from the statements made by the company, that over 1600 engines embodying this improvement are now in use. The pamphlet is devoted to a description of the engine and its improvements, also to a traction engine made by this company, which likewise embodies the spark-arrester, portable engines for saw-mill work, stationary engines, &c.

GAS ENGINEERS' AND SUPERINTENDENTS' POCKET ALMANAC FOR 1882.

We have received a copy of the work bearing this title, issued by the American Meter Co., with offices in New York, Philadelphia, Cincinnati, St. Louis, Chicago and San Francisco. Each of the monthly calendars has a column giving the time at which public lights are to be lit, another for the hour at which they are to be extinguished for each day of the month, and the other column showing the total number of lighting hours. The calculations are made with respect to the moon. Opposite each monthly calendar is a page with the days of the month, the first blank column being for coal carbonized and the second yield per pound, more than half the page being left blank for memoranda. Following the monthly tables are blanks for summarizing the results of the gas works for each month in the year, with a final summary for the year. A considerable number of advertisements relating to articles and materials of interest to gas men occupy a portion of the book. More than half of it is in the form of blank paper, making it a convenient pocket memorandum book.

In launching the gigantic English turret-ship, appropriately named *Colossus*, on March 21, electricity was employed by means of an ingenious contrivance which connected the dog-shores with a large magnet; and in a similar manner the christening was performed. Simultaneously with the breaking of the bottle over the ship's nose a musical instrument inside an ornamental box was set at work, and "Rule Britannia" was the result. By this time the course was reported clear, and as the ship gave evidence of anxiety to leave the cradle, it was deemed advisable, though ten minutes before time, to let her go. The pressure of the launching button was followed by a heavy thud. The weight had fallen and the dog-shores had been knocked away. The ship moved instantly, and the huge mass of 4420 tons—the heaviest ever launched from the Portsmouth yard—glided gracefully down the inclined plane into the harbor, amid the music of the bands and the enthusiastic cheers of the multitude.

Ryland's Iron Trade Circular, in a recent issue says: "There is a new local demand for sheets intended for export to the United States. The Anglo-American Company, which is making roofing shingles in Wolverhampton, has now introduced to that town machinery for cutting out sheets into shapes suitable for use in the making of coal valves, pails and stove shelves. Thus outlined, the

OGDEN & WALLACE,
85, 87, 89 & 91 Elm St., New York.
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Of every description kept in stock.
Agents for Park Brother & Co.'s
BLACK DIAMOND STEEL.
All sizes of Cast and Machinery Steel constantly on hand.

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IRON
ULSTER REFINED COMMON NORWAY
BAND, HOOP, HORSESHOE, CAST, SPRING, FIRE, STEEL TOE CALK and S. S. STEEL.

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Plans and estimates furnished, and contracts made for erecting Iron Structures of every description. Books containing cuts of all iron made sent on application by mail.
Sample pieces at office. Please address
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Commission Merchants
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Agents for the sale of
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Bands, Hoops & Rods.

Borden Mining Company's
Cumberland Coals.

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IRON MERCHANTS
Cor. Albany & Washington Sts.
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Manufacture and have always in stock
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Channels, Angles, Tees, Merchant Bars, Riveted Work, Forgings, Eye Bars, &c.
PATERSON, N. J.
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Hot Pressed Nuts, Bolts, Washers, &c.
DOVER IRON CO.'S
BOILER RIVETS,
Boiler Brace Jaws, Socket Bolts, &c.
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Angle, Tee and Girder Iron,
Boiler and Tank Rivets.
Sole Agents for the celebrated
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Brands of Iron. Also: descriptions of Plate, Sheet, and Gasometer Iron. Special attention to Locomotive Iron. Fire Box Iron a specialty.

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ROME, N. Y.,
Manufacturers of the best grade of
Bar Iron, Bands and Fine Hoops.
scrolls, Ovals, Half Ovals, Half Rounds, Hexagon and Horse Shoe Iron. Also from Charcoal Pig a superior quality of iron branded J. G. All puddled balls reduced by hammer. Orders may be sent to the Mill or to J. O. CARPENTER, our Agent, at 59 John Street, New York.

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METALS,
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Galvanized Sheet Iron,
Best Bloom, Best Refined and Common.
Galvanized Wire, Telegraph and Fence; Galvanized Hoop and Band Iron, Galvanized Rod and Bar Iron, Galvanized Nails, Galvanized Chain, Galvanized Iron Pipe.

CORRUGATED SHEET IRON
For Roofing, &c., Galvanized, Plain or Painted.
Best Charcoal, Best Refined and Common
SHEET IRON.
Plate and Tank Iron,
C No. 1, C H No. 1, C H No. 1 Flange, Best Flange, Best Flange Fire Box, Circles.
ALL DESCRIPTIONS OF
Iron Work Galvanized or Tinned to Order.
Price list and quotations sent upon application.

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120, 122 & 124 Cedar St., New York, and
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Lap-Welded Boiler Tubes, &c. &c.
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Anthracite & Charcoal Pig Irons,
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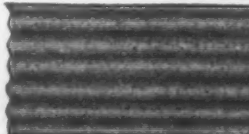
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Also, the James Rowland & Co. Kensington ★ Nails, cut from
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Sifters, Steel Wheelbarrows, Rammers.
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from burrs. Same number of Shoes per keg as in
kegs of unfinished shoes.

sheets have not to pay the duty on the
other side which would be carried by the
scrap inseparable from the cutting up of a
sheet as it leaves the mill, while from the
scrap the ears of the rails are shaped and
the holes punched at the same operation.
The saving of duty and the much lower
original cost of the iron on this side makes it
much more profitable for the company to
carry on in England that part of their opera-
tions described than in the United States.
They have, therefore, sent over all their
shaping machinery, and, quite apart from
their shingle branch, they will use up 25 tons
of sheets per week. At a recent meeting of
tin-plate manufacturers, at Swansea, 247
mills being represented, it was resolved that
there should be a general restriction of make
by the stoppage of mills for one week out of
every four for the next three months after
Easter.

The United States Testing Machine at
Watertown.

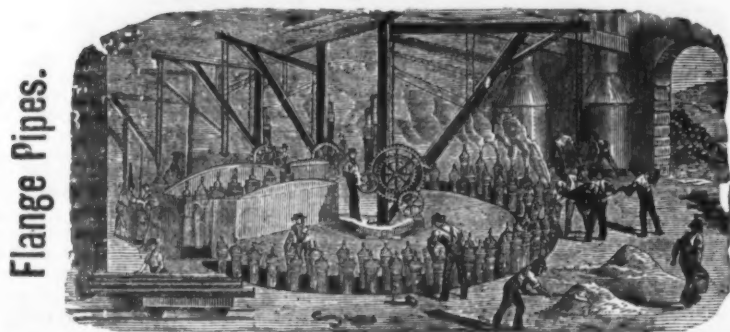
A strong effort is being made at the present
time to induce Congress to appropriate
funds and create a commission which shall
undertake the systematic use of the great
Government Testing Machine at the Water-
town Arsenal, built by Mr. A. H. Emery.
Probably no man in the country ever had
this subject so much at heart as Mr. A. L.
Holley, and some of his most earnest work
was expended in the effort to obtain another
commission which should undertake the use
of the machine and be backed by a sufficient
Government appropriation to carry forward
the work in an intelligent and thorough man-
ner. In this connection it may not be with-
out interest to refer to a paper which he read
upon this subject in February, 1879, before
the American Institute of Mining Engineers.
Although much has been written in regard to
this machine, the particulars given by Mr.
Holley will be new to many. The accuracy
of the machine is astonishing even to those
who have considered at length the principles
involved in it. It will be remembered that
the machine is capable of exerting 1,000,000
pounds of compressive strain, although the
tests which were directed toward developing
the capacity of the machine were numerous,
and the effects of recoil after sudden rup-
tures at maximum loads were watched with
great interest. Tests were made with an
iron link 5 inches in diameter, slowly
strained and suddenly broken, and then to
see if the machine had suffered in any way,
horse-hairs were subjected to tension in the
machine. After breaking a 5-inch link with a
tensile strain of 772,800 pounds, a horse-
hair of only 7-100ths of an inch in diameter
was tested. It stretched 30 per cent. and
broke at 1 pound. Then other horse-hairs
were broken with tensions varying from 1 to
2 pounds. A round bar, turned down in its
center to 3½ inches in diameter, pulled
apart at 430,200 pounds tension; then some
horse-hairs were tested, and copper wires,
about 2-100ths of an inch in diameter, which
averaged a tenacity of about 25 pounds.
Specimens were subjected to 1,000,000 pounds
compressive strains, as we have said, al-
though the contract for the machine called
for but 800,000, and after these proofs, deli-
cate structures, such as eggs and nuts were
tested in compression, and a violin string in
tension. These examples give an idea of the
range of the machine and the perfection of
the apparatus used for measuring the ten-
sion. The weighing apparatus is a reversed
hydrostatic press having diaphragms instead
of pistons. The load is transferred by means
of a fluid, alcohol and glycerine, by a series
of large diaphragms to a series of small ones,
and finally to a system of scale beams. The
weight of 800,000, acting through an incon-
ceivably small space, finally moves a gradu-
ated indicator at the rate of 1-100th of an
inch per pound. One point moving the indi-
cator 1-100th of an inch, moves a platform
against which the load presses 1-42 millionths
of an inch. After giving these and many
other details in regard to the accuracy of the
machine, Mr. Holley says, in regard to the
value of testing large masses, "Constructors
are beginning to find out that they have been
led astray by predicated the physical qualities
of large bars on those of smaller ones. One
might almost as well exhibit a brick as the
measure of the strength of a wall. The very
first high stresses put on this machine were a
striking commentary on the error first re-
ferred to. The link which broke at above
700,000 pounds was sent out by the makers
as '60,000-pound iron,' but it broke at a lit-
tle over 36,000 pounds. The bar which broke
at above 430,000 pounds was made of the
very iron which, having endured above 50,-
000 pounds per square inch in a 1-inch bar,
broke at about 37,000 pounds per square in a
5-inch bar turned down to 3½ inch.

"But measuring the strength of large bars
is not the only advantage of a large ma-
chine; it is equally important to determine
the weakness of structures and so lead to the
development of perfect forms. Given the
strength of individual pieces, it is in possible,
for instance, to calculate the strength of a
lattice column. But a testing machine that
will take in a whole bridge post or a whole
section of a top chord, and subject it to a
steadily increasing and measured stress up
to the point of destruction, such a machine
develops structural defects, as well as the
physical qualities of materials. Comparative
experiments on similar specimens, to test the
accuracy of other machines, have not yet
been made. The fluid pressure in the strain-
ing cylinder and the knife-edge weighing
machine, or ordinary scale, are the only
other systems. However they may answer
for small stresses, it is probable that they
are, as heretofore constructed, totally inade-
quate and misleading for great stresses. The
United States testing machine can apply
1,000,000 pounds compressive stress to speci-
mens of any length up to 30 feet. It can ap-
ply 800,000 pounds tensile stress to links or
specimens made so as to be held by pins of
any length up to 37 feet. By a small addi-
tion to the machine, specimens not occupying
more room than the straining link of the
machine can be tested up to 45 feet length."

In discontinuing the board and allowing
the public to use the machine, it was gener-
ally supposed that much good would result.
In regard to this scheme of allowing indi-

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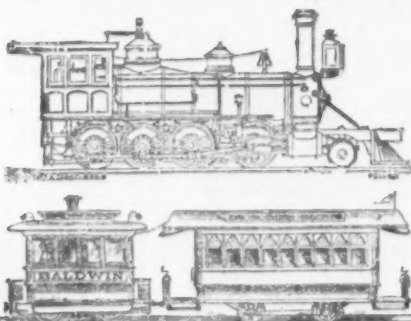
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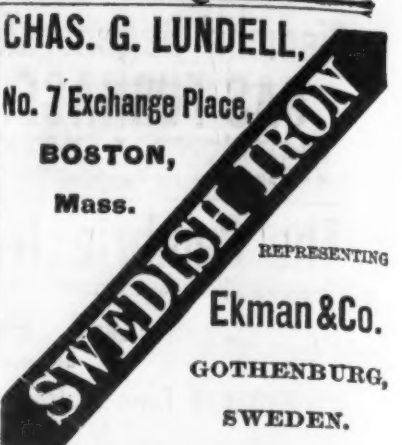
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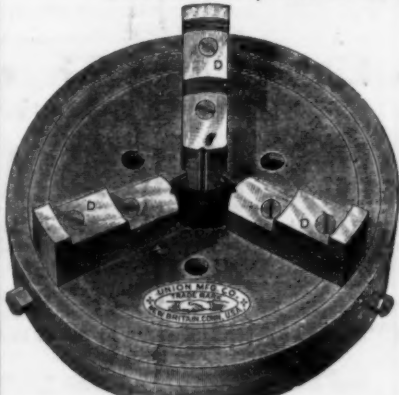
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viduals to make those tests which they find necessary in their own business, Mr. Holley makes the following remarks, which may almost be termed a prophecy:

"There is a general call now for steel long-span bridges. Nobody knows, except approximately, the grade of steel required for the various kinds of stress, or the physical quality of bars of working sizes. Our knowledge of the strength of structures, such as built-up top chords and columns of steel, is still more limited. If anything whatever is known about the results of tests, it is known that a few experiments would be inadequate, if not misleading. Hundreds of full-sized bars and members must be tested before such grades and forms can be determined as will approximate to the possible economy in bridge construction. This means the expenditure of many thousands of dollars. No bridge engineer, no bridge-builder, can afford such experiments, and it is unlikely that any railway or town corporation will undertake them. If an engineer does undertake them, he cannot spend the \$50,000 or more necessary to get complete results, but the \$5000 worth of testing he does buy is fairly his own. The next engineer spends another \$5000 in substantially the same direction; the next spends another \$5000 in a collateral line of investigation, and so on; and if a hundred engineers and corporations should thus spend half a million of money without an organized co-operation, they would be traveling the same ground over again, and three-quarters of the money would be wastefully expended.

"If, on the contrary, the Government should provide a tenth part of this sum, \$50,000, to buy material and make structures, and systematically test them under the superintendence of a board of engineers representing the different branches of construction, and also the manufacture and manipulation of iron and steel, it is probable that every one of the bridge-builders and corporations in the country would get vastly better information, and that the whole science of construction would be at once lifted to a higher plane.

What Mr. Holley predicted has turned out in precisely the way indicated. The machine has been kept busy. It has done admirable work, but that work has been for the individuals; the same ground has been passed over repeatedly. Our knowledge of laws has not been increased, save in a few instances when the experimenters have generously given the results to the world.

Mr. Holley continues: "If twice this sum, which would then be paltry as measured by the results, were thus expended every year, might we not confidently look for revolutionary improvement in the following directions:

"1. The intrinsically ridiculous factor of safety of 6 to 1, half of which, at least, might be called the factor of ignorance—this enormous excess of material which loads down bridges with their own weight, and often exceeds the elastic limit of corporation finances—this dreadful incubus could be so largely removed that the same money would span twice the space.

"2. Despite the so-called factor of safety, bridges tumble down every year, slaughtering hundreds of people and involving enormous expenses. The damages alone for the Ash-tabula Bridge disaster have already reached three-quarters of a million of dollars, and the case is not settled yet. Boilers also continue to explode, and ships to spring a leak at mal-constructed seams. Machinery on railways, in vessels and in works of all kinds breaks in pieces, killing, delaying, bankrupting; the floors of great theaters and factories plunge down among broken columns, torturing and killing men and women in their debris. Is it not probable that the tenth part of the money damages paid for these disasters, if expended in the means of prevention indicated—in the thousands of experiments which would establish a law of fabrication and construction—is it not certain that it would very largely reduce this record of bankruptcy and death?

"3. What an enormous impetus a positive knowledge of the strength of metals and structures under working conditions would give to construction in old, and especially in new, directions to manufactures and to general business! Engineers and mechanics naturally and properly employ the new steels and bronzes very sparingly and cautiously, until they know just what their physical properties are, and whether or not they can be uniformly produced. To supply this information, both to the makers and users of metals, by means of a comparison of chemical analysis with large-sized mechanical tests, is just what the present Board had organized and successfully begun. But the Congress of the United States, the only body which can practically sustain such a system of experiments, does not feel authorized to spend money in this most helpful direction to the people of the United States. It can spend millions on stone forts and cast-iron guns which are likely to afford the country a very limited defense, but it cannot prove the new metals which, in the shape of armor guns and shot, would be a defense indeed. It can lavish untold sums in digging channels for vessels up the creeks of the coast, but it virtuously refrains from squandering the public treasure to make a safe pathway for the locomotive. It can erect monuments and museums; it can dot the land over with public buildings, which, if they are not beautiful, are at least magnificently costly; but it recoils from violating the genius of republican institutions by ascertaining how to make even its own buildings safe and strong. It cannot divert the funds of the people from legitimate channels, such as private claims, in order to promote class interests, such as metallurgy and engineering, although above 250,000 tons of iron are put every year into the bridges on which the people travel; although a million dollars a day were spent during two prosperous years on the iron-work of American railways; although the Government itself ordered 8000 tons of iron and steel supplies in fifteen months in the one department of public buildings, not to speak of public defenses."

A more elegant appeal for means to carry on the great work has not been written. It states in the clearest manner the pressing need for funds to do a work which never can be done by private enterprise. It should be made a conscientious duty by every man to

do all in his power, both by word and action, to forward this work and to create a public opinion in favor of it.

Structural Steels.—VI.

BY ALBERT F. HILL, C. E.

(Concluded.)

ROLLING, STRAIGHTENING, ETC.

As has thus far been shown, cold hammering, punching, shearing—in short, all shop manipulations productive of local pressure—having effects similar to local tempering, impair the homogeneity of the material, and must be either entirely avoided in the management of structural steels, or, where unavoidable, their effects must be counteracted by subsequent annealing or other suitable treatment before the affected parts are permitted to be assembled in the structure. It only remains now to call attention to the effects of certain mill manipulations, which are also apt to have a pronounced effect upon the mechanical properties of the final product. Foremost among these is the rolling and the heat at which this operation is commenced and finished. Overheating or underheating, too hot finishing or too cold finishing, excessive reduction in the passes or too little reduction from the ingot, have all their peculiar influence, and are capable of producing such changes in the steel as to render nugatory the forecast of the mechanical properties based upon its chemical analysis.

Tests made under Dr. Dudley's supervision of two pieces from the same steel, each 1 square inch in section—*Trans. Amer. Inst. Min. Engrs.*—one piece rolled at the highest heat attainable without burning or injury, the other piece rolled at a dull red heat, gave the following results. The first specimen, rolled at high heat, showed an ultimate tensile strength of 70,650 pounds per square inch, and an elongation of 37.5 per cent.; the second specimen, rolled at low heat, showed an ultimate tensile strength of 87,007 pounds with an elongation of 19.8 per cent., demonstrating clearly the hardening effects produced by cold finishing. Lieutenant Barba in his experiments upon beams and angles of comparatively uniform section, rolled by Marrel Bros. at Rive-de-Gier from Terrenoire Bessemer steel, found that they invariably hardened in the last few passes of the rolls; and it is moreover a well-established fact that steel rails with thin flanges, which would finish at a low heat, are more liable to break than rails with thicker flanges which finish at a higher temperature.

Engineers will find that the character of the rolling machinery determines very largely the heating practice in different mills. In mills with abundance of power, strong trains, and proper reductions in the passes, it will be found that overheating is rare, but, on the other hand, in order to save reheating, and with full reliance in the power of the train, finishing is frequently done at too low a heat, and roll-hardening is the result. Again, in mills with weak trains, inadequate power, or excessive reduction for speed of rolling, it will be found that high heating is the rule, and carried to the very verge of safety, and hence burnt steel is not infrequent. Roll-hardened steel is easily cured by annealing, but the heat must be uniformly applied over the whole piece at once, and carried to a bright red—dark red is insufficient in this case—and the cooling must be done very slowly and under exclusion of the air. Burnt steel is best remedied by—rejection.

Another source of danger to the homogeneity of the finished product is to be found in cold-straightening. The presses in many mills are so constructed as to exert absolute shearing stresses, and are apt to do more harm than any subsequent service can do. Cold-straightening ought to be done at almost black heat, and the local effects of the press be modified by distribution over a larger area. This can be accomplished by the use of broad oak wedges or the insertion of pieces of plank. Generally, plates, angles, beams, &c., have of necessity to undergo more or less hammering in the course of construction, and as this produces effects comparable to punching and shearing, though in a much less degree, it becomes necessary, in steel construction, to modify these effects by distribution over enlarged areas. This is done by protecting the metal surface with wood, and substituting heavy wooden mallets for sledges.

SPECIFICATIONS.—CHEMICAL COMPOSITION.

Consideration of the characteristic phenomena in steels of various chemical analyses, and under different mechanical treatment, to which attention has been called in these pages, will naturally lead to the question, What modifications will be necessitated in specifications by the introduction of steel into engineering structures? It will be generally conceded that to the designer must be left the selection of quality, with special reference to the work to be done. To him it must also be left to decide where the line between economical use of iron and of steel must be drawn. In this respect American engineers have many and great advantages over their English confreres—not the least of which is that we are not hampered by "Board of Trade Rules," "Admiralty Rules" and other circumlocution-office rules. The English "rules" allowing iron to be strained to 5 tons in tension, and steel only to 6 tons, would be simply prohibitory, with our ruling prices, to the use of steel in long-span bridges, where lightness is one of the most important considerations. It is the increased amount of mechanical work to which the steel must be subjected in bridge construction and ship-building, that constitutes one of the most important points to be taken into consideration in the choice of material. These structures are composed of a series of members, subjected to unequal stresses, differing in degree and in kind. Shapes vary widely, and are in many cases the result of very considerable mechanical work, and altogether the conditions of service are radically different from the uniform duty to be performed by rails or ship plates.

The specifications for the steel of a large bridge, properly proportioned, will therefore call for a number of grades of the metal, and cannot be taken indiscriminately from hundreds of tons of metal, made from about the same raw material and by about the same pro-

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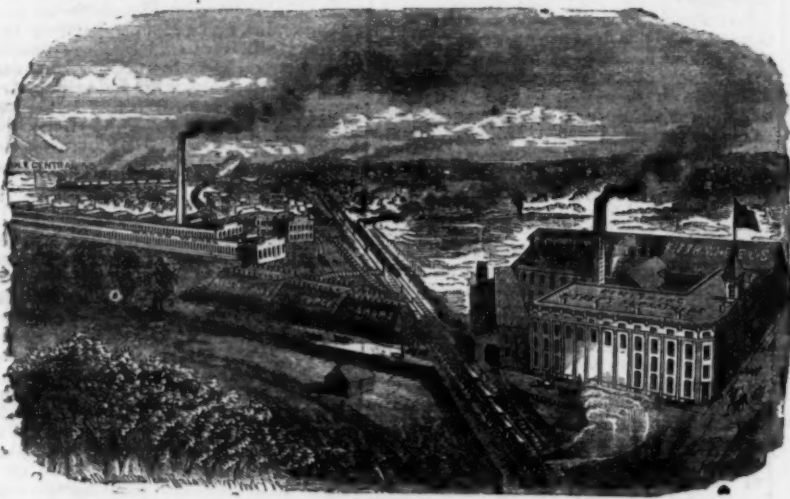
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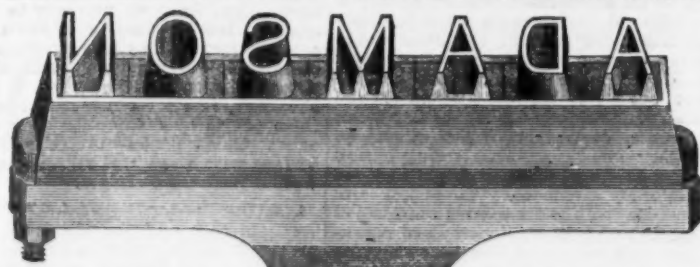
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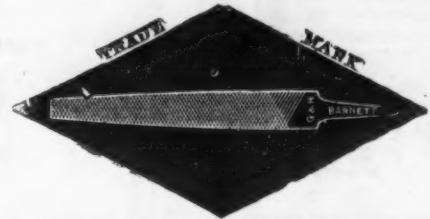
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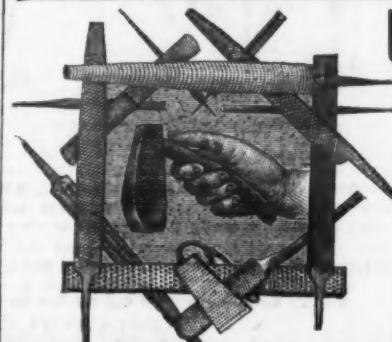
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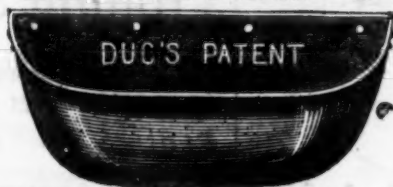
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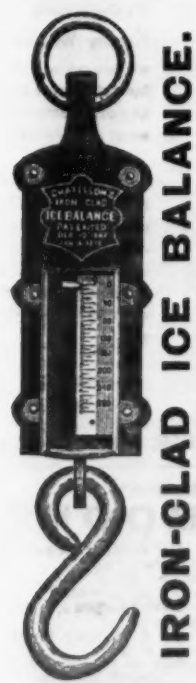
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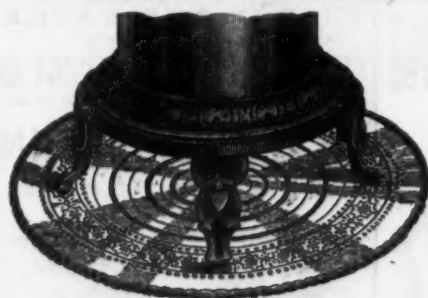


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cess, or rather methods, of manipulation. That the manufacturer cannot make structural steels for the price of steel rails is, of course, evident, and experience alone will ultimately enable us to harmonize the demands of the designer and the wishes of the steel maker who can furnish larger quantities of one grade at a lower figure than numerous small lots under detailed specification. It is, therefore, obvious, considering the intimate relations that exist between chemical composition and mechanical properties, that the engineer must have a voice in the construction of the formula by which the steel for his structure is to be made.

The writer is fully aware that steel manufacturers do not generally concede this, and some even look upon the introduction of chemistry into specifications as an encroachment upon their prerogative. They argue that the chemical composition is of no value to the engineer, as the physical properties are all that the latter has ultimately to rely upon. This is true in a limited sense only, and refers merely to the completely finished product. But the steel has to be worked into eye-bars, has to be punched, riveted, sheared, shaped, hammered, annealed, &c., after it leaves the manufacturer. True, a variety of physical tests so extensive as to cover all these points might readily be devised by the engineer, but it is doubtful if the steel maker would not be put to greater inconvenience by being obliged to hold his mill pending such determinations, or to greater risk by turning out his product ahead of them, than by simply acquiescing in specifications which look to excluding, primarily, recognized elements of danger and failure.

The engineer, having determined upon the strength and resilience of the material suitable for his purpose, and knowing the deleterious influence of certain elements, and the source of annoyance they may subsequently become in the working of the material after it has left the maker's hands, has a right to limit their presence in the steel to a minimum, besides prescribing the physical tests the steel shall stand. All that is to be considered in this connection is how far the engineer may define both chemical composition and physical qualities, and still leave the manufacturer full scope to meet these requirements without any particular hardship and without enhancing the cost of production. These conditions will probably be best fulfilled by leaving the specifications for analysis incomplete. For instance, supposing the engineer desires steel bars which will have to be subsequently worked into eye-bars. The steel will have to undergo several times reheating, forging and annealing before it leaves the mill. We know that silicon acts as a precipitant, and will displace the carbon from its combination with the iron at a red heat. This element must therefore be reduced to a minimum. On the other hand, the presence of manganese in allowable ratio will be desirable rather than otherwise. Moreover, provision must be made for the unavoidable loss in strength consequent upon the several manipulations mentioned. Supposing it is therefore required that the steel for such bars shall have the following physical properties:

Ultimate tensile strength per square inch, pounds	85,000
Elastic limit, per cent.	45,000
Elongation, per cent.	30
Modulus of elasticity not more than, pounds	31,000,000
Cold bending, degrees	180

There will be no particular hardship involved if the specifications require, primarily, that such steel shall show to analysis not more than

Phosphorus	.05
Silicon	.05
Manganese	.50
Sulphur, copper, &c.	.05

thus leaving the manufacturer free to vary the carbon percentage in proportion to the other elements, and to the extent necessary to produce or to meet the physical requirements. The finished product out of such steel—supposing all mechanical treatment to have been properly performed—will probably correspond very closely in its results to those obtained with about .30 carbon steel.

While a classification of the product in accordance with the carbon line is probably most easily understood by both engineers and makers in its general meaning, and therefore of great value, to specify simply the carbon percentage without reference to the ratio of the other elements would be worse than useless, while to specify the carbon, and to limit at the same time the percentages of the other elements, would throw the responsibility for the physical properties of the steel entirely upon the engineer.

Speaking in a general way, the range of steels most suitable for bridge construction will be found to lie between from .20 to .50 carbon, and several of these grades may advantageously be employed in the same structure—the lowest grades for members subject to transverse strains and fatigue from shocks, the medium grades for tension members, and the high grades for members under compression. This adaptation of the grade of the steel to the peculiar service for which it is required, constitutes the greatest advantage steel construction possesses, and if properly availed of, leads to the best proportions in the structure.

Much more light than we have at present on this subject is needed ere general rules for chemical composition can be even approximately laid down, and if the intelligent use of steel in structures is to become the rule rather than the exception, it will require cordial co-operation of designer and manufacturer. Only a full knowledge of the other's wants and means will enable each to solve intelligently the problems and elaborate the details pertaining to his field of practice.

BASES OF STRENGTH.

If all the advantages that steel offers to the designer are to be reaped, our present methods of dimensioning must undergo considerable modification. Foremost among the changes most imperatively demanded, is the establishment of a basis for safety factors which shall truly represent the margin or ratio between the working load and the limit of usefulness of the material for structural purposes. This limit is reached at the point at which "permanent set" first takes place—generally, but erroneously called limit of elasticity—and which might therefore be properly called the "safe strength" of the material. It is being more and more

generally recognized among engineers that it is a fallacy to claim for a structure a factor of safety of six, because the maximum recurring stresses in it are about one-sixth of a load, the single application of which would produce failure. It will therefore be well to adopt primarily this "safe strength" or elastic limit, as the basis to which the factors of safety are to refer. The knowledge of the ultimate strength is nevertheless of great importance, and will always, in a measure, guide the determination of the safety factor, but not by making it the basis for the latter. The intimate relation existing between strength and ductility (see Tables III and IV) finds further expression in the gradual increase of the ratio between elastic limit and ultimate strength, as the latter increases, so that this ratio of elastic limit to ultimate strength may be fairly said to be in inverse ratio to the ductility of the material. Now, the greater the range of elasticity in a material, the more ample warning it gives of its failing strength, and vice versa. Therefore this ratio of elastic limit, to ultimate strength may be used as a guide in the quantitative determination of the requisite factor of safety for a given structure or its different members. For instance, referring to the "safe strength" or elastic limit as basis, a factor of 2 will probably be found quite sufficient in cases where this ratio of elastic limit to ultimate is as 1:2; but where we find this ratio larger, we shall also find a corresponding decrease in the ductility of the material, hence less warning of impending failure, and must therefore adopt a correspondingly larger safety coefficient.

Another point for consideration is the fact that the ratio of thickness to width exerts a considerable influence upon the tensile resistance (Table XIV.) This will require to be taken into account in dimensioning very wide and comparatively thin eye-bars, and also in accepting test results of small specimens as a criterion of the strength of plates. In general, specimen tests will always give results from 10 to 15 per cent. in excess of what the full-sized members will show.

Altogether, dimensioning in steel, while it affords the designer exceptional opportunities for display of engineering skill, requires also careful consideration of the susceptibility of the material to treatment, and hence no attempt ought to be made to establish a uniform basis of strength, as has been done in iron construction, nor could any such attempt be fruitful of anything else than confusion and obstruction. Designers in steel will have to establish and to change constantly the basis of strength calculation with the adaptation of the greatest number of physical properties to the particular structure under consideration.

PHYSICAL TESTS.

To prescribe tests in such a manner that they shall be at once exhaustive indications of the characteristics of the material, and yet not become burdensome, is no easy task. It may be accepted as a general rule that specimen tests are of small practical value outside of the field of scientific investigation, and if made in sufficient number to become really serviceable in the course of a construction, their preparation in lathe and planer will take a great deal of time, and be a considerable item of expense. Of course, they cannot be altogether dispensed with, and are in some cases even the readiest means of settling a question at issue. For instance, if it is suspected that the steel has roll-hardened, or that it is burnt, duplicate specimens, one tested as it comes from the rolls, the other after annealing it, will tell a short, but very effective, story.

For the determination of modulus of elasticity carefully prepared specimens ought to be used, and the writer would call attention right here to the vital importance of this so generally neglected factor in strength determinations. Full-sized eye-bars are readily tested up to 1 1/4 to 1 1/2, the maximum stress they are dimensioned for; this is fully within the elastic limit, and ought, therefore, occasion no loss of material, and give at the same time definite indications of both strength and workmanship. For plates and angles the cold-bending test—before and after annealing—is the easiest of application, and, after all, the most decisive.

Where large presses are available, transverse tests of beams within the elastic limit and up to double the amount of calculated or allowed deflection, are readily and quickly made. The cutting of specimens from web and flange for tests is slow and expensive work, and tells but little. The drop test (under a hammer in guides and with equal heights of fall) will give very conclusive data, especially if comparison is made between the behavior of annealed and unannealed beams. Compression tests of small specimens are almost valueless, unless at least the proportion of length and diameter in the full-sized member is closely reproduced. An exhaustive series of steel-column tests is most needed at the present moment. Testing, of course, must include the effects of punching, shearing and annealing, but very few specimens, even in a large structure, will suffice for very good conclusions, if the other and preceding tests have been carefully made. Testing without taking into account every detail that exerts influence, is apt to lead to serious errors, and is merely a useless waste of time and money.

INSPECTION.

Every engineer knows that no specifications were ever drawn for an important structure from which more or less deviation had not to be made during the progress of the work; this being the case, it becomes evident that the inspector ought to be a man of large practical experience, as well as of sound theoretical knowledge, so that both constructor and manufacturer may be able to rely upon the soundness of his judgment. Unfortunately it is no uncommon experience in steel works to have an inspector reject in one case material which, though not quite complying with the letter of the specifications, is quite serviceable and acceptable, and in another case accept work and material which, though apparently in accordance with specifications, is unfit for use, and would be promptly rejected by the maker himself if he had an opportunity to decide.

In steel construction, probably more than in any other, the inspector is a necessary

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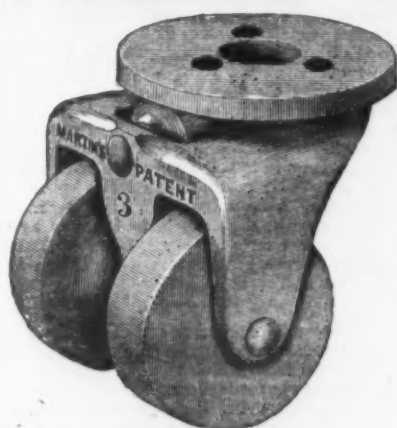
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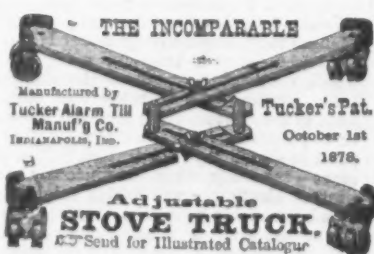


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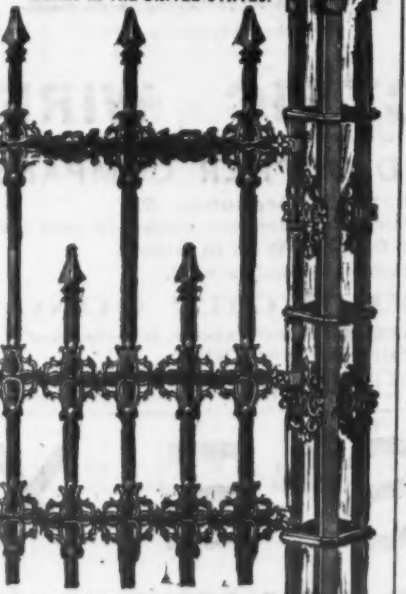
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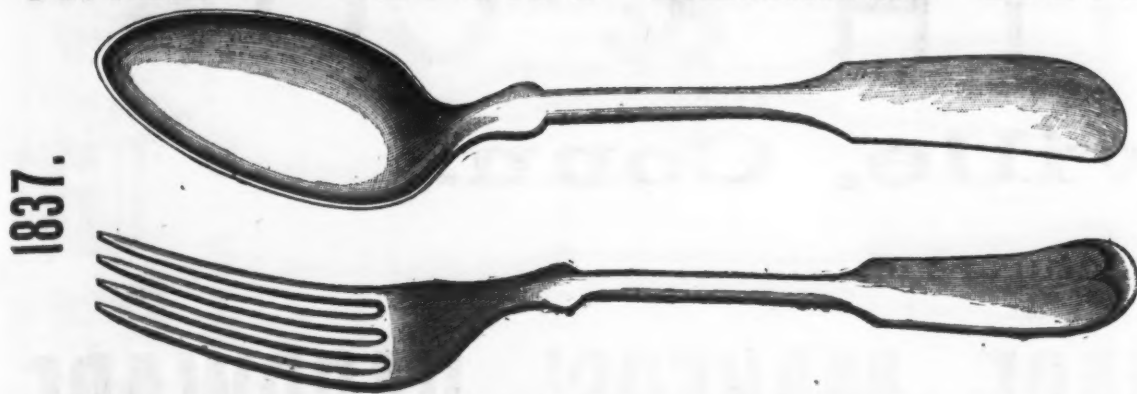
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adjunct of the constructor; but ripe judgment, that familiarity with the material which can only be acquired in the mill and shop, and a thorough knowledge of the wants of the structure, coupled with the faculty of utilizing to the fullest extent the given means of the mill or shop, are absolute requisites for his usefulness. The sending of inspectors to steel works for educational purposes will be found fully as expensive to their employers as it is likely to be annoying and productive of loss to the steel maker, though it does occasionally afford some quiet amusement to superintendents and foremen.

The working of steel in every stage requires care, and, above all, intelligence, and the men engaged in it must be impressed with the necessity for careful manipulation and rational treatment.

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

FIRST REGULAR MEETING OF 1882.

(Concluded.)

Fri'ay Evening Session.

Mr. Oberlin Smith presented the following resolution, which was referred to a committee already appointed having similar matters in its hands:

I move that the chair appoint a committee or refer the matter to the present Standard Gauge Committee, to confer with technical schools and societies regarding the feasibility of uniting in establishing a National Bureau of Information and Standards. The committee to report at a future meeting.

Immediately following the informal discussion which took place upon this motion, a number of gentlemen presented resolutions thanking the various persons for the hospitality which had been tendered to the society.

The first was presented by Mr. Barr:

Resolved, That the thanks of the American Society of Mechanical Engineers are due, and are hereby tendered to the citizens of Philadelphia for the elegant reception which, through the committee, Messrs. Geo. B. Roberts, A. J. Drexel, Geo. W. Childs, Geo. H. Boker, Dr. Wm. Pepper and Professor Fairman Rogers, was given them at the Academy of Fine Arts, and that while they regard the same as a high personal honor, they prize it also as a mark of the esteem in which the profession is held in a city owing so much of its well-earned reputation to its scientists, its engineers, and its manufacturers.

Resolved, That to the various industrial establishments of Philadelphia, to whose open doors we have been so cordially invited, we have our thanks to offer, mingled with regrets that want of time prevented us from a general acceptance of the same. To the gentlemen connected with the few establishments to which time permitted us to make a brief visit, including as it does the firms of Wm. Crump & Son, John Roach & Son, the Baldwin Locomotive Works, Wm. Sellers & Co., the Whitney Car-wheel Works, Wm. Bement & Son, the Southwark Foundry and Machine Company, Ostheimer Bros. and others, and also Commander Pierce Crosby, of the United States Navy; the Trenton Iron Company, of Trenton; the Betts Machine Company, of Wilmington; Riehl Bros., of Philadelphia; Fairbanks & Co., and others who gave us special invitations to visit their works, we desire to return sincere thanks for the attentions shown us.

Mr. Woodbury presented the following:

Resolved, That this society tender its thanks to the Franklin Institute for the use of its hall, deeming it an honor to hold its sessions in a place of such importance, where engineering first became a recognized and honored profession in this country; also, that the members of this society desire to express their obligations to the trustees and officers of that institution for the courtesies received at their hands.

Mr. Rae presented the following:

Resolved, That the thanks of the society are eminently due to the Engineers' Society of Philadelphia, for its courtesy, hospitality and great helpfulness on the occasion of our spring meeting, which have contributed in so important a degree to its great success.

Mr. Wolff's resolution was as follows:

Resolved, That the secretary be directed to send copies of the foregoing resolutions to the various persons and firms from whom the society have received attention.

"The Expansion of Steam and Water without Transfer of Heat," by Mr. A. Faber DuFaur was read by Mr. Wolff. It was an interesting paper, which presented in a graphical way solutions of many of the questions involved in the expansion of steam without the transfer of heat. It is, however, impossible, without giving the whole paper, to give any fair or connected idea of the subject matter. The reading itself was practically a synopsis of the paper, indicating its scope and more important features. In conclusion, Mr. Wolff dwelt at some length upon the need of experiments upon this subject, in order to make our knowledge complete.

Professor Thurston said it shows how many minds are working in the one direction. We are absolutely at sea in regard to this whole matter; we are so far at sea that we have not our bearings; even in the theoretical treatment we are in the dark. The exponents that we use in the treatment of these assumed hyperbolic curves are of unknown magnitude. It is assumed that they are sufficiently correct for every-day work. The indexes found from indicator curves are not of a character to give us confidence in the results which we obtain in the determination of the amount of heat consumed. In answer to questions the Professor says we rely upon Zeuner, but we do not find that his exponents are correct. Even in my paper yesterday I could only take such rough experiments as could be obtained. In fact, all the work that we can do is of the roughest kind, and is practically preliminary. The whole field is dark before us. In reply to Mr. Wolff the Professor said that Mr. Zeuner's formula had not been overlooked by him, but he stated that it is only substantially correct, since in it a constant is employed instead of a variable.

Mr. Oberlin Smith then read a paper on the "Position of Views in Mechanical Drawing." This paper gave an elaborate analysis of the different methods of making views in mechanical drawings, and a description of those methods more commonly employed. After illustrating the different styles of drawing and showing the advantages of each, he explained his own preferences and his reasons for them. The plan of using the paper as the envelope of the piece to be drawn and supposing it to have been unwrapped, he did not approve, but rather used the paper as a plane upon which the different features of the object have been projected, the object itself being supposed to be rotated in various directions.

"Belts Connecting Pulleys on Non-parallel Shafts" was the subject of a paper by Prof. J. D. Webb. The paper itself was supplemented by the use of models and by drawings upon the blackboard. It was a very clear and logical explanation of those cases in which the rules commonly followed for ascertaining the intersections of beltings gave inaccurate results.

The next paper was by Mr. Horace See upon "Built-up Work in Engine Construction." Mr. See's paper, which was illustrated by a number of very clear drawings, was devoted to showing the special advantages which arise from the use of built-up rather than solid work in the construction of large engines. Some of the principal members which he mentioned were the cranks, connecting rods, and bed-plates. By making these members of pieces of medium size, not only was the work done more cheaply, but greater facility was obtained in the construction and the strength was greatly increased. Quoting from *Engineering*, he showed the absolute impossibility of insuring a large forge perfectly sound. The Servia's crank-shaft weighed some 30 tons when it left the hammer, yet, when finished, its weight was cut down to 18 tons. Here was an enormous waste of metal and increase of cost, in addition to the dangers entailed by that method of construction. A solid rod would take about five weeks to forge, while a built-up rod of similar construction would be made in about eighteen days. An additional advantage was that the parts could be spread over a number of tools. In answer to a question by Mr. Kent, Mr. See replied that another advantage of built-up work was that steel could be used as well as iron, and the masses be divided up to almost any extent.

Mr. Kent then spoke of the necessity of using a high-carbon steel, and also in working it to get as far from the hammer and as near the hydraulic forging as possible, in order to avoid the cracks and flaws which light hammering is so prone to produce. We must either use this hydraulic system or else use a big hammer like that at Creusot. Mr. Kent also made reference to the fact that flaws can be increased to almost any extent by light hammering, and referred to the experiments where a ball of metal was increased to double its dimensions by light tapping. In answer to a question, Mr. See said that the Servia's new shaft was made by Vickers. Professor Thurston referred to the fact that he had seen large shafts shaken to pieces by light hammers, and spoke of the disintegrating effects of a series of light blows. In regard to the materials for shafts and machinery, Whitworth's compressed steel seems to be in the direction of improvement, and he expressed his belief that the Whitworth method would be generally used for the construction of large members of machinery. The hardening of large members of steel can be fairly carried on, although the details of the process are not now generally known. We may even use steel with 1 per cent. of carbon. He then spoke of some beautiful pieces of Whitworth metal worked by the hydraulic method. The practice of using built-up work has been known for a long time, and has been used where the hammer was light and large pieces were needed.

Prof. Fred. Hutton read a paper on the "Action of a Sample of Mineral Wool Used as a Non-Conductor Around Steam Pipes." The paper was illustrated by a number of samples of mineral wool which had been used for the protection of a 5-inch steam pipe. Parts of it had been so placed as to be perfectly dry, others had been exposed to dampness. All the samples had been inclosed in a case of galvanized iron. In some portions the pipe was deeply corroded, so deeply, in fact, as to reach the roots of the screw-thread. This corrosion had evidently been very intense, for the scales were, in many instances, thick and heavy. The wool had been in place only two or three years. A part of it was laid in a tunnel lined with the so-called blue stone or blue flagging, of New York, and cemented. The wool that had been kept from moisture was light and porous, while that which was wet was solid and of considerable density. The professor advanced a hypothesis in regard to the chemical reactions which had taken place, and showed some experiments which made the hypothesis seem very plausible. The corrosion of the pipe was vastly more serious than would have been possible simply in the presence of moisture, showing that there must have been an active corroding element present at the time. From the results obtained it was judged probable that the wool itself underwent some sort of a decomposition. In concluding he emphasized the fact that the corrosion of the pipe took place only where moisture found access to the wool.

Mr. Kent said he thought this was a very good point, but it seemed improbable to him that the silicates of the wool were in any way decomposed. While it was possible that the wool might have occluded sulphurous acid, it did not seem likely that sulphureted hydrogen would be evolved from any decomposition of the sulphurous acid gas to the sulphuric acid that has done the work. A miscellaneous discussion followed, in which the danger of using plaster of paris in connection with iron and the recognized effect of nitric acid upon chemical appliances, was spoken of.

In reply to Mr. Kent, who thought it was hardly probable that the silicates could be decomposed in the manner described by Professor Hutton, Mr. Partridge said that the corrosion of a silicate like glass was a well-

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For particulars see issue of March 2, 1882.

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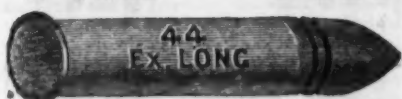
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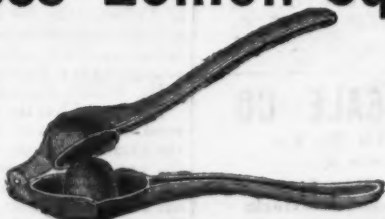
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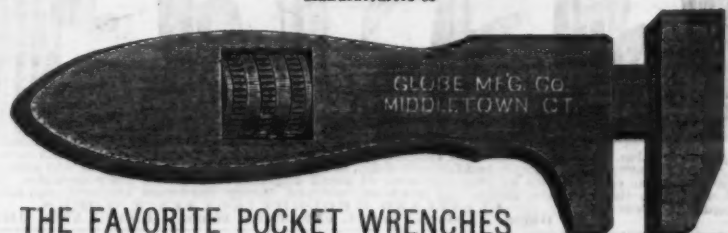
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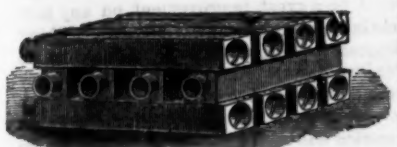
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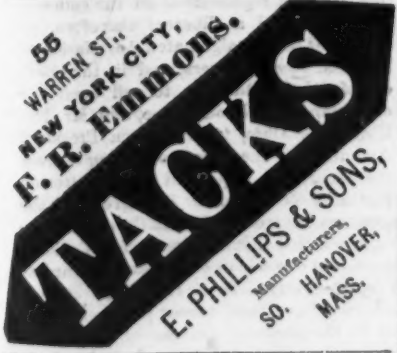


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Pat. 545

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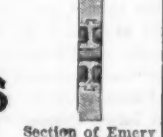
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Section of Emery
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Machinery of almost every description.

Pat. Jan. 26, 1866.

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This Packing is made in lengths of about 20 feet, and of all sizes from 1/4 to 2 inches square.

Pat. 17,308, 273,601

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known fact, and often took place without the
aid of heat to accomplish the work. Mineral
wool is a silicate in which the base is often
largely in excess, and, consequently, it
seemed quite probable that in the presence
of moisture and heat decomposition might
take place, by which the destructive ele-
ments are liberated.

Mr. A. F. Nagle read a paper on "Heater
Performance." Mr. W. I. Auchincloss then
exhibited what he called a "Center of Gravity
Machine," but which might perhaps be
called a general average machine also. Its
merits and capabilities were explained and
exhibited and illustrated by Mr. Auchincloss,
who showed that it was not only capable of
determining the location of the center of
gravity of such set weights as the engines
and boilers of a steamer, but could be applied
to finding the centers of displacement and
to solving other similar problems. Much
interest was excited when the inventor
stated that it could also be applied equally
well to averaging accounts, and gave some
very interesting illustrations. The machine
itself consists of a movable balancing table,
upon grooves in the face of which are set
weights, of the different sizes which repre-
sent five, ten, hundred and thousands.
These weights may be used to represent the
mass of engines, boilers, &c., or may be
used to represent amounts of money. To
use them they are placed in their relative
position upon the table, which will be the
same as their relative positions to each other
in the mass whose center of gravity is to be
ascertained. After being placed the table is
slid into a position of equilibrium, and a

home of the descendants of General Greene,
of revolutionary fame, and the place where
Light-Horse Harry Lee breathed his last,
and where he remains now repose.

The Peerless Pipe Grip.

The Prentiss Vise Co., of No. 23 Dey
street, New York, have recently put upon
the market what they call "The Improved
Peerless Swivel-Jaw Pipe Grip," a represen-
tation of which is afforded by Fig. 1 of the
engravings. This pipe grip is adapted to
use upon any ironworker's vise. This
engraving shows its appearance when at-
tached to the jaws of a vise ready for use,
while Fig. 2 illustrates each part in detail,
showing the features of construction. The
grip is fastened to the jaws of the vise by means
of studs projecting from the face-plate which
hook under the lower edge of the jaw, and
a set-screw which engages the top of the jaw
and acts against the studs mentioned.
The swiveling motion is obtained by a double
face-plate as clearly shown in the engraving.
The body of the grip is made of the best
quality of malleable iron. The holding
bits which, by inspection of the engraving,
it will be seen are easily removed, are of tool
steel. They are so constructed as to be
readily sharpened, tempered, or replaced
whenever required. The special advantage
claimed by the manufacturers for this article
is that every part is interchangeable, and
that all parts can be duplicated on call. The
swivel jaw of this grip automatically adjusts
itself to any required angle on long pipes,

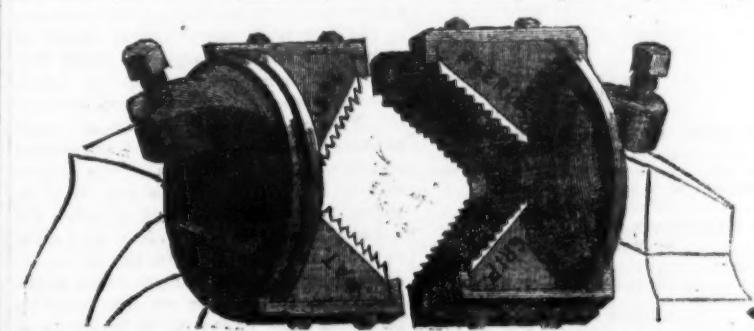


Fig. 1.—The Peerless Pipe Grip Attached to the Jaws of a Vise.

pointer gives the average. The value of a
machine like this was illustrated by Profes-
sor Thurston, who spoke of an old ship-
builder who had always been in the habit of
finding proper positions for the engines by
finding the centers of the gravities of the
engines and boilers by means of weights
placed in a model. Crude as this method
was, it was much better than calculation;
the new instrument will give still more
accurate results.

Some remarks were here made in regard
to the corrosion of steam chimneys upon
the inside beneath hair felting, and it was
incidentally remarked that on some steamers
the use of hair felting had been given up on
account of the corrosion which had taken
place under it. The action was supposed to
be due in some way to the felt, as the other
non-conductors did not produce similar ef-
fects. There were some experiments going
on bearing upon this point.

The next paper was read by Prof. Gaetano
Lanza, of the Massachusetts Institute of
Technology, upon the "Experiments Made by

and thereby obviates loss of time in the ad-
justment of bearings or rests otherwise re-
quired to bring it to a proper bearing in
the jaws. This same feature enables the
operator to hold short pipes, couplings, nuts,
thinblades, plates, &c., in a vertical, slanting,
or horizontal position, thus securing great
economy of labor and time. Two sizes are
made, the smaller one adapted for use in 3 to
4 1/2-inch vises, and holding pipe from 1/4 inch
to 2 inches in diameter. The larger size is
adapted to vises from 5 to 7 inches, and holds
pipes from 1/2 inch to 5 inches in diameter.
The smaller size weighs 6 pounds, and the
larger one 11 pounds, thus making the tool
easy to be carried from the shop to outside
work. Its adaptability to all kinds of vises
used by machinists, blacksmiths, and steam
and gas fitters, makes it particularly accept-
able in mining operations, and under other
situations remote from machine shops.

Cornell University.

We have just received the Cornell Univer-
sity Register, which contains considerable
information of interest regarding the studies
pursued, the requirements for admission, &c.
Among the various subjects considered, we
would mention civil, mechanical and mining
engineering, and although no department of
the last mentioned has yet been formally
established, all the instruction required by a
mining engineer is given. It is intended,
at an early day, to supplement the existing
force of professors by the appointment of
such additional professors and lecturers as
are necessary to the establishment of a min-
ing school for the most advanced work, both
as regards theory and practice. As it is, the
University, by its existing provision in the
several departments, is enabled to give such
instruction that a student graduating in
them can, in a very short time, acquire all
the necessary practical information. In the
department of mechanical engineering every
facility is offered to the student to make
himself thoroughly conversant with the
application of theory to practice. Instruc-
tion is given in molding, casting and forging,
as well as in mechanical drawing. This
course is progressive, from geometrical
drawing to the designing of machines and
the production of complete working draw-
ings. The appliances for instruction consist
of several hundred drawings selected from
those of technical schools abroad, and from
representative American steam engine
makers and others; of photographs, models
and machines; and of apparatus used in
copying by the "blue print process." The
library in connection with the University
contains about 40,000 volumes, and is acces-
sible to all students. Want of space prevents
us from giving due consideration to the
various other branches of science which are
taught, and we will therefore simply say
that the high standing of the institution, as
well as the large staff of efficient professors,
warrants the assertion that a high degree of
proficiency may be attained in the several
studies.

A Tree of Iron.—There is a curious work
of art on the grounds of the State House at
Columbia, S. C. It is an iron casting com-
memorating the South Carolina soldiers who
died in the war, whose names are inscribed
on brass tablets at the base. A correspond-
ent says: "The success of this casting con-
sists in its perfect imitation of the living
palmetto—the favorite tree of South Caro-
lina. We had heard of this statue in other
places, but had never been able to believe
the stories of the flexible leaves bending in
the breeze, supposing this phenomenon an
optical delusion, but such is really the case.
The long, thin leaves of iron, lifelike even
to the hair-like fibers of the twigs and
branches, wave tremulously in every zephyr,
and the whole tree, painted artistically, has
so close a resemblance to the real tree as to
deceive the acutest observer at the distance
of five rods."

Mr. T. M. Carnegie, of Carnegie Bros. &
Co., has purchased the property known as
Dungeness, on Cumberland Island, Ga.,
and proposes to erect a fine residence on the
site of the ruins there, which are among the
grandest in the South, having been the

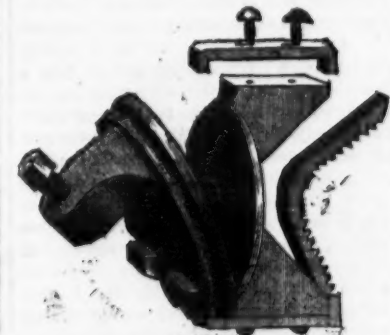


Fig. 2.—Details of Parts of the Grip.

The Iron Age

Metallurgical Review.

New York, Thursday, May 11, 1882.

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JAMES C. BAYLES, Editor.
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According to a statement from the Secretary of the Navy, the national marine now comprises 63 vessels, of which 33 are reported as "efficient for immediate use." To repair and put in condition the remaining 30 it is estimated will cost \$3,173,000, and the time necessary for that purpose is variously estimated at from 2 to 18 months—18 months being the estimated time required on five of the vessels. The communication also states, in response to inquiries as to the penetrating power of the most powerful gun in actual service, that the most powerful gun in the

8-inch muzzle-loading rifle (converted), whose actual power at 1000 yards distance is to perforate a plate of solid wrought iron 8½ inches thick. Its range is 10,280 yards at 39 degrees elevation, and its weight is 17,550 pounds. It carries a ball weighing 180 pounds, and is discharged by a load of 35 pounds of powder. There are 51 of such guns actually available for service. The communication also embodies a detailed statement of the cost of repairs on vessels since 1865, the total being \$23,075,000, and the total cost of vessels in the navy is set down at \$72,345,778.

The Tariff Commission Bill.

The passage of the Tariff Commission Bill on Saturday last, by a vote of 151 to 83, shows a great deal more clearly than the deluge of talk which preceded the vote, that the controlling sentiment in Congress is decidedly favorable to an intelligent revision of the tariff in the interest of domestic industry rather than of foreign trade. (The text of the bill will be found in our Washington letter.) There is still a great deal of speculation as to the probable composition of the commission, no one having suggested the probability of a veto by the President. While it is probable that certain gentlemen prominently opposed to the principle of protection will secure appointment on the commission, we are by no means sure that such appointments are desirable, or that it is due to the free trade party that it should be represented. It is scarcely probable that there can be harmony or unity of action between gentlemen so widely and unconditionally opposed to each other as are some of those who have been named as probable members of the commission. Such gentlemen as Mr. David A. Wells and Mr. J. S. Moore, for example, could not approach the work of tariff revision without prejudices so strong as to unfit them for the intelligent consideration of any evidence which might be submitted. The man who has made up his mind that protection is iniquitous in principle, and in its effects detrimental to the best interests of the country, cannot properly weigh and consider arguments which manufacturers might bring forward showing that a tariff for protection is necessary to the manufacturing interests of the country under existing conditions. It is scarcely to be expected that they will agree in the report which would suit the majority of the commission, and there would be little reason to expect from their minority report anything of benefit, except such advertising as they might get for themselves by securing the extensive publication and discussion of their views. We should also be sorry to see upon the commission any of the gentlemen who have been looked upon as the founders of the American school of political economy. Their prejudices are as strong as those of Mr. Atkinson, Mr. Moore and Mr. Wells. Probably they are equally incapable of weighing evidence as to the amount of protection required by our manufacturing industries. It would be much better in every way if the commission could be composed of clear-headed, practical business men, who, while thoroughly in sympathy with American interests, are able to take a conservative view of the subjects to be considered, and are likely to advise a reasonable tariff, so adjusted as to favor domestic production without placing any greater burdens upon imports than the best interests of the country demand. Such a commission can easily be organized. If the *doctrinaires* are excluded, Congress and the country will have much greater respect for the conclusions reached by it than they would were it composed of gentlemen who have been prominent before the country as advocates of extreme views on either side of the great question of protection. We want as the result of the deliberations of this commission a bill which shall commend itself to all reasonable men, and which Congress shall have no excuse for refusing to pass—a result which cannot be hoped for if the control of the commission is given to men who are committed to extreme views either way.

Hoop Iron and Axles.

The hearing before the Secretary of the Treasury, on the 5th instant, regarding the duty on so-called "splayed hoop iron" and "forgings for axles," was quite an important one. It is rarely, if ever, that so many manufacturers have appeared at one time before the Secretary of the Treasury in a customs case. There were representatives from Bordentown, N. J.; Philadelphia, Pittsburgh, Sharon and Erie, Pa.; Youngstown, Cleveland and Cincinnati, Ohio; Detroit, Mich.; New Albany, Ind.; Chicago Ill.; and St. Louis, Mo. The splayed hoop-iron case had been decided by the Secretary, but, at the request of the importer, it had been reopened. The importer, however, was not present at the hearing.

The argument of the manufacturers was to the effect that the first point to be decided in classifying an article for duty is, Is it mentioned by its specific name in the tariff? If it is it must pay the duty levied upon the article under that name. It is only after it is determined that it is not specifically named that the "not otherwise provided" clauses are operative. Taking up the question as to each separate, it was argued that as to the so-called splayed hoop iron, the article was at least once hoop iron, and if nothing had been done to it to take it

out of the category of hoop iron, it was still hoop iron. It was shown that the hoop iron had been cut to length, punched once and splayed, and it was argued that neither one nor all of these take it out of the category of hoop iron. Decisions of the Treasury Department and of the courts were quoted to sustain this view. It was also shown by the sample which was present that the hoop could be splayed in the last pass through the rolls. From these points it was claimed that the metal had not ceased to be hoop iron, nor had it ceased to be adapted to the general purposes to which hoop iron was designed, as three-fourths of all the hoop iron made was used for hoops, barrels, tubs, pails, &c. In fact, the nearer a piece of hoop iron came to being a finished hoop the more truly was it hoop iron. In regard to the axle question a different line of argument was pursued. The argument was that the tariff provided that axles or parts thereof should pay a duty of 2½ cents a pound, and it was shown beyond a shadow of a doubt that the articles imported as forgings for axles were universally known as axles in the trade. Some 70 affidavits on this point had been filed. The importer claimed that as the axles were not completely finished, they were not axles; but it was shown that they were never sold finished, but always in the rough state; but whether finished or not, it was asserted that as he had shown they were universally known as axles, and as the act required axles to pay 2½ cents a pound duty, these axles should pay that duty. Arguments were also made by Joseph D. Weeks, C. S. Tyson, of Philadelphia, attorney for the American Iron and Steel Association, and R. C. Parsons, of Cleveland.

A large number of legislators were present at the hearing, among them Senators Mitchell, of Pa., and Sewell, of N. J., and Representatives McKinley, Bayne, Townsend, Watson, &c.

Course of the Spelter Market.

Spelter, since the beginning of the present year, has attracted much more attention than it did in 1881. Last year this metal did not show much vitality till late in the fall, when, after dropping all the way to 4½ cents, it finally advanced to 5 cents. During the first quarter last year, as compared with 1881, it ruled as follows:

PRICE OF DOMESTIC SPLYER AT NEW YORK.	
January 7.....	5.00
14.....	5.00
21.....	5.00
28.....	5.00
February 4.....	5.00
11.....	5.00
18.....	5.00
25.....	5.00
March 4.....	5.00
11.....	5.00
18.....	5.00
25.....	5.00

At the enhanced price this year, domestic spelter has shown great steadiness. It would not unlikely have advanced beyond 6 cents but for the heavy importation of Silesian, of which some 3500 tons arrived during the first quarter of the year. The price of domestic spelter remained tolerably steady under these heavy arrivals, whereas some brands of Silesian are said to have sold in February as low as 5½ cents on the dock. The firmness of the domestic product in the face of these unexpectedly large imports, was due, on the one hand, to the curtailed output at the West, in consequence of the failure and stoppage of works, and on the other, to increased consumption in this country since September last year. The increase noticed was not only in brass manufacture and for rolling purposes, but especially for galvanizing, notably fence wire.

Our present output does not, according to our estimate, exceed 18,000 tons annually, while our consumption may this year reach 30,000 tons, provided business in the branches identified with this trade does not fall off materially during the remainder of the year. If this prove to be a correct valuation sustained by facts, we should in all this year require an importation of at least 12,000 tons, assuming that we are to carry into 1883 a stock of 2000 tons, the same as in 1882. If continued or renewed stoppage at the West prevents our output from reaching our estimate of 18,000 tons, we should have to draw from abroad an amount equal to the deficiency.

As we have shown, we received during the first three months quite a supply from abroad, equal to 3500 tons, and may therefore not need more than 8500 tons of the foreign product for the remaining nine months. We have purposely gone into the details of our probable requirements and shown how they are to be met, because erroneous notions as to what our market can stand with impunity in the way of importation are too apt to prevail, thus tempting outside adventurers to dabble in any metal that may strike their fancy for the moment, and too frequently to the detriment of themselves and the domestic producer.

Besides, the importer is but too frequently inclined to think that a metal, after it passes from his hands and those of the New York dealers, is virtually absorbed and gone into consumption, whereas a number of months pass before the supposition becomes a fact, and this although the goods may not be visible here in first and second hands. To suppose that we shall suddenly be compelled to draw a large supply of spelter from Europe at the rate of 1500 tons per month the year through, may therefore prove a mistake, involving loss if persisted in, especially should a so-called "syndicate,"

now announced to have been formed, succeed in raising the price in Europe to a point at which it would become doubly precarious to order it for the American market.

Little sanguine as we have felt about the price of metals in general ever since the commencement of the year, our views with respect to spelter are as here expressed, especially if outside importers, not sufficiently informed as to what, under the circumstances, our real requirements are or are likely to be, are tempted into speculative enterprise. Nor is it at all certain that a so-called syndicate of producers, for the purpose of establishing and maintaining a higher value in Europe, will prove a better success than on two previous occasions within the past few years. Silesian and Rhenish-Belgian producers may come to an understanding, and in good faith adhere to it, but they may not find it so easy to keep steadily in control the English smelter from Spanish Calamine. We mention this to prevent persons in the trade from jumping at the conclusion that a mere decreeing of a combination on the Continent places the metal beyond any vicissitude for months to come. Besides, the 12,000 tons we may require from Europe do not materially relieve the producers, for their total output we may safely estimate at 150,000 tons for the current year. If we withdraw 8 per cent. from it, or even more, it does not ease their position much, should consumption diminish from any cause.

The general accounts received from the other side assure us that since September last galvanizing is making notable strides there as well as here, perhaps even more so, because more recently adopted there for a variety of purposes, such as the manufacture of nails, wire and hollow-ware. While, therefore, the spelter traffic of the two hemispheres may now appear even more promising than a year ago, there is, at the same time, in our judgment no reason for over-sanguine expectations as regards its value in the near future. With respect to the syndicate above alluded to, it was definitely formed on April 19, and is stated to embrace two-thirds of the entire European output.

Reckless Expenditure in the Navy Department.

Investigations into the accounts of the Navy Department under Secretary Robeson's management, which were called for by Mr. Hewitt's resolution, show, in a very striking way, the danger of maintaining a great government system for naval construction and repairs. To take one item out of a great many, we may select the case of the monitor Miantonomah, an ironclad of the third class, which has rendered no service of importance since the close of the war and which originally cost \$240,522. In repairs and improvements to the engines between 1865 and 1869, there were spent \$16,570. During the eight years of Mr. Robeson's service in the Navy Department, there were spent on additional repairs and new machinery for this same vessel, \$336,851, and it was left in such a condition that during the next two years expenditures amounting to \$114,417 were considered necessary. In a word, during the eight years of one Navy Department administration \$481,964 were spent in repairs and improvements upon the engines of a vessel which originally cost complete, in the time of highest prices, \$240,522. This vessel is now laid up at League Island and demands extensive repairs before it can be sent to sea. How large a proportion of this reckless expenditure is due to the system under which the work of the Navy Department is done, the reader can infer. When the navy yards were established they were probably very necessary to the maintenance of naval armament. That necessity has long since passed, and about all the present value of our navy yards is to maintain large pay-rolls for political purposes. The work which the Government needs, both in construction and repairs, can be done better and cheaper, and in every way with more benefit to the country, at private shipyards than at the navy yards, and as a measure of economy, as well as for the purification of national politics and the civil service, the sooner navy yards are entirely and unconditionally abolished the better. If the Government could compete with private enterprise in this matter there would be some logical reason for maintaining the navy yards, but it cannot. When the requirements of the country during the late war were immediate and imperative, the navy yards were wholly incapable of supplying what was wanted. Their equipment is not adapted to modern naval construction, and the kind of vessels they were provided to build are no longer needed. They can probably be sold to good advantage, and for any work the Government needs, private enterprise will provide facilities. As an incidental advantage of this large economy, the shipbuilding interests of the country would be fostered by Government patronage, and the cost of shipbuilding would be lessened. The management of our Navy Department has for years been a scandal and a disgrace, and it would be better to give up even the pretense of a navy than to continue wasting the public money through the costly and useless disbursing machinery of our navy yards.

On the opposite page we print an interesting table, prepared by Mr. Nimmo, Chief of the Bureau of Statistics, showing the quantity and value of the iron ores imported into the United States during the calendar year ended December 31, 1881. It will be seen

that the 782,887 tons had an average custom-house valuation of a very little over \$2.82 per ton.

Mexican Trade and Reciprocity.

Having invested a large amount in railways to develop trade between Mexico and the United States, the Mexican railway interest, as might have been expected, is now pushing vigorously the effort to secure international free trade. The increase in the movement of merchandise between Mexico and the United States, from \$4,131,000 in 1880 to \$8,371,000 in 1881, is held as an indication of what may be expected if our tariff system is so far modified as to give free access to Mexican products on the basis of reciprocity with that country. We have no doubt whatever that trade between the United States and Mexico could be very much increased by such a policy of concession, but it is decidedly a question whether the advantage to be gained would be worth the sacrifice involved. The plain English of the matter is this: a great deal more capital has been invested in the Mexican railways and in American lines to reach the Mexican frontier than the requirements of trade called for. The prospect of dividends is not all that was hoped, and the gentlemen who have gone into these speculative ventures are now looking to the Government to help them out by changing its financial policy. It would be better to consider this matter carefully before we change our tariff system to accommodate these gentlemen. The sugar interest of Louisiana, the rice interest of the Carolinas, and the wool interest of the whole country, should not, we think, be sacrificed in the interest of railroad companies. Were these sacrifices made in the interest of Mexican trade, we would gain therefor no advantage which would not be as freely and fully conceded to England, and while it is possible that our bankers and merchants could provide facilities for business with Mexico that would be a great improvement on any now existing, it is doubtful if any one seeking Mexican trade would be willing to extend to Mexican buyers, the unlimited credit they have been accustomed to receive from British houses. Up to this time trade with South America has been done by Great Britain on an entirely wrong principle, but it is a principle by which she has held and secured that trade against all foreign competition, and which she is not likely to abandon now, especially in view of the efforts of American merchants to secure a foothold in that country. In the matter of developing our commercial relations with Mexico, we think we should do well to make haste slowly, and to be sure that we do not make the irreparable mistake of exchanging our birthright for a mess of pottage.

The Amalgamated Association of Iron and Steel Workers has taken up our suggestion regarding a representation of labor upon the tariff commission. It says: "The Iron Age" in its issue of the 14th ult. favored the "representation of labor on the tariff commission to be appointed by President Arthur. We have all along claimed that inasmuch as the duties of such a commission on revision of the tariff will necessarily have to investigate the labor side of the question, at least one of the members of said commission should be a direct representative of labor. There is no doubt that the commission would look at the labor side of the question as much as the limited knowledge would admit. But the idea that a commission of none but manufacturers or business men could do the labor side of the tariff question adequate justice is preposterous. We therefore hope that the Committee of Ways and Means of the House of Representatives will see to it that labor is represented on the commission. We feel at liberty, therefore, as officers of the Amalgamated Association of Iron and Steel Workers, and in the interest of labor generally, to call upon the chairman of said committee, and Mr. McKinley, of Ohio, to wait upon President Arthur with the view to having at least one labor man appointed by the latter on the tariff commission." We agree with the suggestion, but would add that the representative so selected should be one who is widely known and one whom labor would regard as its representative. Since the suggestion was made we have seen names proposed which may be the names of persons of ability and well fitted to represent labor, but they have no national reputation. Such men as John Jarrett, of the Amalgamated Association, Mr. Armstrong, of the *Labor Tribune*, or Mr. Layton, of the Knights of Labor, would fill the necessary requirements. They have a national reputation among workmen; they would be unhesitatingly accepted by labor as representing it, and they would bring to the commission the study and experience of years devoted to questions of interest to labor and the tariff.

Some two hundred manufacturing concerns in and near Rochester, N. Y., have signed the following resolutions:

Resolved, That we, the undersigned employers, while recognizing the right of every individual to sell his labor at the best rates attainable, when or where he pleases, denounce as destructive to business all combinations of labor that presume to dictate to the employer by striking or threatening to strike, thereby usurping the right of the employer to discharge and hire as the employer's judgment may dictate.

Resolved, That, as our only remedy against combined labor dictation, we, the undersigned, hereby pledge ourselves that should any such

combination, directly or indirectly, interfere with the proper conducting of the business of any one of our members, we will make it our particular business to overcome the same, even though it should require the combined action and the suspension of business of all the subscribers. To this end we will be guided in the taking of future business, that nothing shall prevent our hearty and perfect co-operation.

Resolved, That this association pledges itself to use all honorable means to protect independent labor, either in or out of workshops of its members, and to vigorously prosecute all offenders against the rights of the same.

Resolved, That nothing contained in the above shall be construed to mean that this association will, under any circumstances, sanction or uphold oppression of workmen by any of its members.

Organization can only be met with organization; but whether the union of manufacturers will be productive of good or evil depends upon how they use the power secured through union. It is an old proverb that "there is nothing so timid as a million dollars, unless it be two millions." When it comes to a contest of endurance, labor will win, for it will make sacrifices of which capital is incapable. With intelligent and wise management, the Rochester experiment may bring about good results. We shall watch it with interest.

The Census Bureau has published some information of great statistical interest, showing the extent and value of farm property in the United States, and the increase in the acreage under cultivation in the States in which agriculture is extensively carried on. The following table shows the actual number of farms in the States named in 1860, 1870 and 1880:

	1860.	1870.	1880.
California.....	35,934	53,724	118,716
Dakota.....	17,435	1,720	123
Illinois.....	255,741	309,803	143,310
Indiana.....	194,013	161,289	131,850
Iowa.....	145,351	116,492	64,163
Kansas.....	181,564	38,202	10,400
Kentucky.....	166,453	118,422	90,814
Michigan.....	154,008	98,786	62,434
Mississippi.....	101,772	68,091	47,540
Missouri.....	215,575	148,368	92,721
New York.....	241,058	216,353	196,990
North Carolina.....	157,609	91,505	75,303
Ohio.....	247,189	198,053	179,880
Pennsylvania.....	213,542	174,641	158,357
Virginia.....	118,587	78,849	62,805
Wisconsin.....	134,342	109,904	69,270

These figures show some interesting comparisons. The largest increase in the number of farms during the past 10 years has been in Kansas, Iowa, Missouri and North Carolina. By far the greater proportion of the farms in this country range from 20 to 500 acres. The number containing 1000 acres is very limited, and except in California, represent a comparatively small proportion of the farm holdings. In the Southern States, Louisiana, Missouri and North Carolina, a good many farms have 1000 acres, but as land increases in value, a considerable subdivision is probable. In the case of the Southern States, it would perhaps be better to call them tracts rather than farms. The prosperity of the farming classes is shown by the fact that about two-thirds of the farms of the United States are owned by the occupants. Good land is so easily acquired in this country, that conditions are exceptional in which it pays a man to lease a farm or work it on shares.

The extensive use of the term "engineer" in the sense of a man of education and scientific attainments, who designs work and directs the efforts of others, has raised the question in the minds of some members of the profession whether some other word than this cannot be devised for designating those men who tend engines. The English term "engine driver," has been suggested for this class of men, leaving the term "engineer" to be applied exclusively to the man of education. While this distinction may seem very desirable in the minds of some, we doubt if such a change is necessary. We think it hardly possible that any great confusion can ever arise. It certainly would be difficult to effect a change as radical as this in habits of writing and speaking that are already formed. Should the engineers who manage engines ever become ashamed of their brothers who design engines, it will be a proper thing for them to take some steps to originate a term by which they can be designated without fear of mistake. Seriously speaking, if any distinction in terms is to be made, or if a new name is to be introduced, it should belong to the educated members of the engineering profession. The usage of centuries is not easily changed by arbitrary distinctions. From time immemorial the term "engineer" has been applied to those in charge of engines—not necessarily steam engines, for the term is older than the invention of the steam engine, but to those who managed engines of war and mechanical devices of various kinds. The attempt at the present time upon the part of the educated gentlemen of the profession to restrict the use of the term "engineer" to themselves, to the exclusion of those who perhaps know as much, but who make less pretensions to academic honors, may be only another instance of an engineer hoist with his own petard.

We may now expect a final decision as to who owns the basic process in this country. The Harrison Wire Company, of St. Louis, have purchased from Mr. Jacob Reese, of Pittsburgh, what is understood to be a license to manufacture dephosphorized steel in their new works in Illinois. This question must come up sooner or later, and it might as well come now. What Mr. Reese has to sell will probably be determined by judicial inquiry. If he can grant valid licenses to work the basic

process in this country, the gentlemen who have paid considerable money to secure a monopoly of that process will find themselves pretty badly "left." If he cannot, the Harrison Wire Company will find their position more interesting than satisfactory. It is a natural presumption that the parties in interest know exactly what they are doing, and that when the litigation is over others will know a great deal more about the status of the basic process than we do now.

The balance of trade is now heavily against this country, taking the statistics by months, but it is scarcely probable that the year's average will find us in debt in our exchanges. The following are the foreign trade statistics for March, as compared with the same month last year:

	1881.	1882.
Imports of merchandise.....	\$66,789,174	\$68,592,753
Imports of specie.....	7,074,852	1,460,330
Total imports in March.....	\$66,684,026	\$69,053,083
Exports of merchandise.....	\$5,668,794	\$6,614,539
Exports of specie.....	1,509,246	4,755,822
Total exports in March.....	\$6,598,040	\$7,370,361
Balance in our favor.....	17,914,014	2,682,722
Balance against us.....		

This comparison shows a change, as compared with last year, of \$20,596,726 against this country in a single month. For the nine months ended with March, 1881, (making three-fourths of the fiscal year) the exports exceeded the imports \$156,217,020. For the nine months ending with March, 1882, this excess has been reduced to \$50,088,454, a change in the balance of trade for nine months of over \$106,000,000.

The appointment by the Russian Czar of M. de Giers as successor of Prince Gortschakoff in the Foreign Office of the empire, is accepted by Europe as an evidence that Russia desires to maintain peace. The withdrawal of the veteran diplomatist may reasonably be regarded as marking "an epoch in European history," but the tacit assurances of good-will now given serve not only to allay apprehensions, but to strengthen confidence in the maintenance of the Treaty of Berlin. That there are still misgivings in the European mind respecting the future, it would be in vain to deny.

The Dominion revenue for the 10 months ended with April, amounted to \$27,171,978, or nearly \$3,900,000 in excess of that for the same period in 1880-81. This statement is pointed to with satisfaction by the present administration, as an indication of the success of the present protective policy. The surplus for the current year will be over \$7,000,000, which is due in no small share to increased importations, the aggregate customs collections for the period named being \$17,389,975, against \$14,570,426 for the corresponding period in 1881.

There are increased arrivals of Chinese at the Pacific ports, not only in California, but in Oregon and British Columbia. It is evident that several large railroad corporations, such as the Northern Pacific and the Canadian Southern Pacific, anticipating the enactment of a restrictive law, have offered strong inducements to Chinese immigrants, in the shape of \$25 to \$30 a month for a term of years. As the supply is not equal to the demand, the folly of restricting Chinese immigration is evident.

There is no change in the labor situation at Pittsburgh. As we announced in our last issue, the conferences have been postponed until May 22, and in the meantime action is to be taken in regard to the demand by the Amalgamated Association at large. Just what the outcome will be it is difficult to say.

Iron Ore Importations in 1881.

TREASURY DEPT., BUREAU OF STATISTICS, WASHINGTON, D. C., April 26, 1882.			
Statement showing the quantity and value of iron ore imported into the United States during the year ended December 31, 1881, by countries:			
Countries.	Tons.	Value.	
Brazil.....	800	\$9,000	
France.....	44,466	103,440	
French Possessions in Africa and adjacent islands.....	147,165	433,955	
Germany.....	1,034	17,033	
England.....	76,547	285,463	
Scotland.....	2,846	10,566	
Ireland.....	14,959	34,483	
Gibraltar.....	1,600	5,539	
Nova Scotia, New Brunswick and Prince Edward Island.....	5	37	
Quebec, Ontario, Manitoba, Rupert's Land and Northwest Territory.....	44,222	143,446	
British Columbia.....	1,100	1,622	
British Possessions in Africa and adjacent islands.....	716	2,867	
Italy.....	89,225	260,030	
Portugal.....	21,947	63,379	
Russia, on the Baltic and White Seas.....	967	30,812	
Spain.....	327,848	753,373	
Turkey in Asia.....	2,687	66,000	
Turkey in Africa.....	2,850	5,317	
Uruguay.....	505	1,700	
Total.....	782,887	\$2,222,652	

* Correct per certified invoices. This ore, or the most part of it, is imported by chrome works for its chromic acid.

JOSEPH NEMO, JR., Chief of Bureau.

James F. Freeborn died in this city on the 9th inst. He began life as a grocer's clerk, continuing in that employment from his 17th to his 27th year, when he formed a partnership with Mr. John J. Crane, under the firm name of Freeborn & Crane, in the business of ships' supplies. In 1840 the partnership was dissolved, and with his brother, William A. Freeborn, he formed the firm of William A. Freeborn & Co., metal founders. For 30 years he was the chief manager of the establishment, which grew into a great business interest, and still exists under its early name.

WASHINGTON NOTES.

(From Our Own Correspondent.)

WASHINGTON, D. C., May 10, 1882.

The closing scenes of the Tariff Commission discussion were quite spirited. The House having disposed of the contested election cases of Lynch vs. Chalmers, and having appropriated approximately \$2,000,000 for new public buildings, Mr. Kasson, from the Committee on Ways and Means, promptly renewed his motion that the House resolve itself into Committee of the Whole on the state of the Union, to proceed with the consideration of the Tariff Commission bill. After considerable skirmishing between the opposite political parties, led by Mr. Kasson and ex-Speaker Randall, the former withdrawing his motion to limit debate, the discussion was taken up by Mr. Jonathan Chase, of Rhode Island, in favor of the bill.

On May 3 the discussion was continued, Mr. Wm. M. Springer, of Illinois, taking the floor, and assuming that the advocates of the bill desired to revise the tariff by increasing the existing rates of duties, and in view of the fact that a bill increasing certain duties had already been acted upon favorably by the Committee of Ways and Means, opposed the bill.

Mr. Julius C. Burrows, of Michigan, next took the floor and generally reviewed the debate in both Houses, by making citations from the principal speeches, and summed up by remarking that it was "a matter of congratulation that the Democratic party has at last come to anchor upon this subject and raised the banner of free trade." * * *

This is the issue you have sought, this is the issue you have made up, and upon it we go to the people and await their verdict with the utmost confidence and composure. The next speaker was Mr. Joseph C. S. Blackburn, of Kentucky, who submitted a lengthy harangue in his characteristic speech and noisy style. In printing his speech he has incorporated as a legend in the title "A tariff for a revenue is a tax, a tariff for protection is a robbery." This individual is very immense on jingling and high-sounding phrases. During the electoral discussion in 1876 this same party hoisted his banner with the bombastic declaration "he who dabbles is a dastard; he who doubts is damned," and before the contest was over hauled in his horns very perceptibly. His speech against the Tariff Commission Bill was full of wind and very little wisdom.

On the same day Mr. J. E. Kenna, of West Virginia, was glad that all were in favor of tariff revision and the bill.

Mr. S. S. Cox, of New York, dubbed his remarks "Reciprocal Brigandage of the Tariff. Its Postponement and Exactions," and, quoting from Lord Bacon, announced "the forward retention of custom is as turbulent a thing as revolution," and made an entertaining speech in favor of free trade.

Mr. R. P. Flower, of New York, took the ground that there was no excuse for the discussion or the bill, and believed in Congress doing the work itself.

On May 4 the discussion was resumed, Mr. J. W. Candler, of Massachusetts, Mr. W. Goddard, of Pennsylvania, Mr. J. F. Briggs, of New Hampshire, addressing the Committee of the Whole in favor of the bill, and Mr. J. J. Finley, of Florida, W. H. Hatch, of Missouri, Mr. G. C. Cabell, of Virginia, E. L. Martin, of Delaware, Lowndes and Davis, of Missouri, Mr. Robert M. McLane, of Maryland, W. R. Morrison, of Illinois, against it.

On May 5 ex-Speaker Randall, of the Committee on Ways and Means, spoke on the political aspect of the question, and endeavored to show by Democratic platforms and the speeches of party leaders, the position of the party on the important questions of revenue and expenditures. The ex-Speaker expressed the hope that authority would be given the Committee on Ways and Means to meet on November 10, to proceed immediately to formulate a bill based upon the testimony taken, and so that at the opening of Congress in December the committee would be ready to report forthwith its measure of relief to the House for action before the Committee on Appropriations would require the time for general appropriation bills. The ex-Speaker favored a mixed commission, so that some one might be on the floor of each house to explain the necessary details. Mr. Whitthorne, of Tennessee, then spoke against the bill, and Mr. Curtin, of Pennsylvania, for it. Then Mr. Tucker, of Virginia, a member of the Committee on Ways and Means, took the floor against the bill, and spoke at great length. His views were the same as expressed several years ago on the hoop iron resolution.

Judge Kelley, chairman of the Committee on Ways and Means, closed the general debate in a most effective manner, by exposing the errors and misrepresentations of some of the principal speakers. The gentleman paid his respects to Mr. Dunnell in a most forcible way, calling the gentleman to a realizing sense of his errors of fact, and caused quite a parliamentary brush for a few moments.

Mr. Kelley, commenting upon Mr. Dunnell's speech, declared that his statistics showed that arithmetic was not one of his strong points. That gentleman had said that Bessemer steel companies were making profits of 65 or 70 per cent. a year, and had contended that it would be a crime not to reduce the duty on steel rails.

Mr. Dunnell—The statement which I made with regard to the profits of the Bessemer steel works in 1880 was taken from the report of a special agent of the Census Bureau, and I think that the gentleman will admit that that report states that the profits of the investments for that year were as I have stated.

Mr. Kelley—If the gentleman will produce that part of the census report which sets out any such profit as that, I will buy a few shares of stock in the company and give them to him.

Mr. Hewitt—You couldn't do it. They are too dear.

Mr. Kelley maintained that there was nothing in the report that justified such a statement. The mistake was in assuming that the capital of the Bessemer steel com-

panies embraced the capital employed in the contributory enterprises, such as the purchase and working of coal mines and iron ore beds. He proceeded to ridicule Dunnell's speech, declaring that if there had been imported the number of tons of steel rails which the gentleman had asserted, the duty would have amounted to \$10,426,508,596. (Laughter.)

Mr. Dunnell—The sentence which the gentleman has read is in every respect correct, except for the typographical error (which the ordinary mind would discover at once) in the word "tons" taking the place of "pounds," and if the gentleman is driven to the strait of building arguments on typographical error, he has a very sandy foundation on which to stand. (Laughter and applause on the Democratic side.)

Mr. Kelley—I am building up an argument to show the unfitness of this house to frame a tariff, and I am building it up by asking the committee to consider the facts which, on the honor of these gentlemen, have gone to the public as facts and which will probably be corrected now. (Laughter.)

Mr. Dunnell—I am led to admit that if the chairman of the Committee on Ways and Means reflects the intelligence of the committee in the interpretation of a sentence, then we ought to have a tariff commission. (Laughter.)

Mr. Kelley—It may be a typographical error.

Mr. Dunnell—The figures are each one of them correct as to quantity, and the amount I gave as the revenue received is correct to a mill, and the mind at once sees that there is an error in the sentence. There is no difficulty with the ordinary mind to see the typographical error.

Mr. Kelley—I read from the Record. The gentleman revised his speech, put it in pamphlet form, and sent it to his constituents, reiterating the story of the tons.

The Judge then drew out Mr. Hewitt, of New York, who had declared that the Bessemer steel manufacturers in the United States realized 67 per cent. profit. The Judge pronounced this untrue. Hewitt replied that he had the proof. Kelley shouted, "No, you have not. It is not a fact."

Voices from the Democratic side, "Read, Read."

Mr. Kelley—Yes, let us hear the proof.

Mr. Hewitt then read a slip from the testimony in a Bessemer steel case in court.

Mr. Kelley—That is the testimony of a buyer, not a manufacturer.

Mr. Hewitt—I believe the letter is a genuine one.

Mr. Kelley—Yes, you believed the Morey letter genuine.

At this juncture Mr. Hewitt involuntarily sank into his seat, and the whole House broke forth in uproarious laughter.

Judge Kelley spoke for more than two hours in a most eloquent and forcible manner, and completely overwhelmed those who had the hardihood to tackle him on questions relating to the statistics or other matters bearing on the tariff. Following Judge Kelley's speech a number of amendments were presented, one by ex-Speaker Randall, providing for a mixed commission; one by Mr. McLane to recommit the bill, with instructions to report a bill for the repeal of all Internal Revenue taxation, except on spirits, fermented liquors and tobacco, and reduction of the tax on whiskey to 50 cents per gallon; one by Mr. Springer, that in the appointment of the commissioners the various interests of the country should be recognized, as agriculture, railroads, mechanical industries and manufacturers of certain articles.

On Saturday, May 6, the day very generally agreed upon to take a vote, the debate on amendments began soon after the House assembled. These amendments are interesting as showing the diversity of sentiment on tariff in the House.

Mr. Carlisle, of Kentucky, submitted an amendment providing for a select committee of nine members of the House of Representatives.

Mr. Cox, of New York, proposed that "the bill be recommitted to the Committee on Ways and Means, with instructions to report a bill so revising the tariff as to make it conform to the principle that revenue shall be the only standard for export duties."

Mr. Townsend, of Illinois, proposed an amendment amendatory of Section 3022 Revised Statutes, authorizing the use of salt for curing fish, paper used in printing, &c., mechanics' tools and agricultural machinery, educational and religious books and engraving, articles used in medicinal preparations, in bond, and if so used the duties to be remitted.

Mr. Springer, of Illinois, in addition to his commission already proposed, further proposed that not more than five members should be of one political party.

Mr. Cox, of New York, proposed a commission selected from the two Houses of Congress.

Mr. Upson, of Texas, proposed a commission representing both political parties, and the leading interests involved, and another amendment for the election of five members of the commission by the House.

Mr. Hammond, of Georgia, proposed that the commission serve without compensation.

Mr. Morrison, of Illinois, moved an amendment prohibiting any revision providing for a duty in excess of 50 per cent. ad valorem on the following articles: Cotton and cotton goods, earthen and earthenware, hemp, jute and flax goods, metals, provisions, sugars, spices, wool and woolen goods and sundries. These articles furnished \$86,230,966 duties in 1881, and it was estimated that the loss of duty at the rate proposed on the amendment would be \$15,061,742.

Mr. Tucker, of Virginia, a member of the Committee on Ways and Means, and the gentleman who will be remembered as pressing the cause of the importers of hoop iron in the House, submitted the following affecting iron:

Provided, however, That the said commission be, and is hereby, instructed to include the following provisions in any plan for revision of the tariff reported by it:

1. From and after the — day of — 1883, there shall be levied, collected and paid on iron bars for railroads or inclined planes, and on steel railway bars and railway bars made in part of steel, \$14 per ton. On chains, trace-chains, halter-chains and fence-chains made of wire rods, 35 per cent. ad

valorem. On plows, harrows, spades, shovels, hoes, mattocks, picks, axes, hatchets, scythes, sickles, cutting and hay knives, reaping-hooks: on anvils, blacksmiths' hammers and sledges, axes or parts thereof; on files, file-blanks, rasps, and floats, augers, gimlets, saws of every kind, and all knives used in any mechanical trade; and upon all other tools and implements used for agricultural, mechanical, manufacturing, and mining purposes, of which iron or steel is a component material of chief value; and upon anchors or parts thereof, and iron cables or cable-chains, 35 per cent. ad valorem.

A large number of other articles were included in five additional provisions.

Mr. Morrison, of Illinois, remembered as the father of the free-trade bill of the committee under his chairmanship, submitted an amendment to prohibit any higher rate of duty than now exists on certain articles specified, among them, "On all iron and steel and on all manufactures of iron and steel of which such metals shall be the component part of chief value, and on all metals or manufactures thereof."

Mr. Hewitt, of New York, an aspirant for the Democratic Presidential nomination in 1884, moved an amendment as follows, and in conformity to the following principles:

1. The repeal of the duties on raw materials.
2. The proportionate reduction of the duties on articles manufactured from raw materials thus placed on the free list.
3. No duties to exceed 50 per cent., except those on luxuries.
4. No internal revenue duty to be imposed on alcohol used in manufactures.
5. Where practicable, duties to be made specific, by converting ad valorem into specific duties on the basis of average market value.

The amendments were voted down one by one, when Mr. Kasson moved the previous question on the bill and amendments. Mr. Mills, of Texas, then made the final issue by moving to recommit the bill with instructions, which, he stated, were the same as those proposed by Robert J. Walker in the tariff of 1846.

Resolved, That the bill creating a tariff commission be recommitted to the Committee on Ways and Means, with instructions to report within 30 days a bill framed in compliance with the following instructions:

1. That no more money should be collected than is necessary for the wants of the Government, economically administered.
2. That no duty be imposed on any article above the lowest rate that will yield the largest amount of revenue.
3. That below such rate discrimination may be made descending in the scale of duties, or for imperative reasons the article may be placed on the list of those free from all duty.
4. That the maximum revenue duty should be imposed on luxuries.
5. That all specific duties should be abolished and ad valorem duties substituted in their place, care being taken to guard against fraudulent invoices and undervaluation, and to assess the duty upon the actual market value.
6. That the duty should be so imposed as to operate as equally as possible throughout the Union, discriminating neither for nor against any class or section.

On this the yeas and nays were called, and the amendment was rejected; yeas, 75; nays, 152; not voting, 64. The entire vote for recommitment was from the Democratic party.

The amendment recommended by the committee to strike out the authority to inquire into the internal revenue system was agreed to, 130 to 17. An amendment in regard to the printing of the testimony and time for submitting the report (first Monday in December, 1882) was then passed, and the previous question ordered, when Mr. Kasson, of the committee in charge of the bill, made the closing remarks. On the passage of the bill the vote stood: yeas, 151; nays, 83; not voting, 57. The vote on the bill reflected the united Republican support and 20 Democrats. The vote against the bill was made up of the bulk of the Southern vote, and a large number of votes from the West, all Democrats.

The following is the text of the bill as passed:

To provide for the appointment of a commission to investigate the question of the tariff:

Be it enacted, etc., That a commission is hereby created, to be called the "Tariff Commission," to consist of nine members.

Sec. 2. That the President of the United States shall, by and with the advice and consent of the Senate, appoint nine commissioners from civil life, one of whom, the first named, shall be president of the commission. The commissioners shall receive as compensation for their services each at the rate of \$10 per day when engaged in active duty, and actual traveling and other necessary expenses. The commission shall have power to employ a stenographer and a messenger, and the foregoing compensation and expenses to be audited and paid by the Secretary of the Treasury out of any moneys in the Treasury not otherwise appropriated.

Sec. 3. That it shall be the duty of said commission to take into consideration and to thoroughly investigate all the various questions relating to the agricultural, commercial, mercantile, manufacturing, mining, and industrial interests of the United States, so far as the same may be necessary to the establishment of a judicious tariff, or a revision of the existing tariff upon a scale of justice to all interests, and for the purpose of fully examining the matters which may come before it; said commission, in the prosecution of its inquiries, is empowered to visit such different portions and sections of the country as it may deem advisable.

Sec. 4. That the commission shall make to Congress a final report of the results of its investigation, and the testimony taken in the course of the same, not later than the first Monday in December, 1882; and it shall cause the testimony taken to be printed from time to time, and distributed to members of Congress by the public printer, and shall also cause to be printed for the use of Congress 2000 copies of its final report, together with the testimony.

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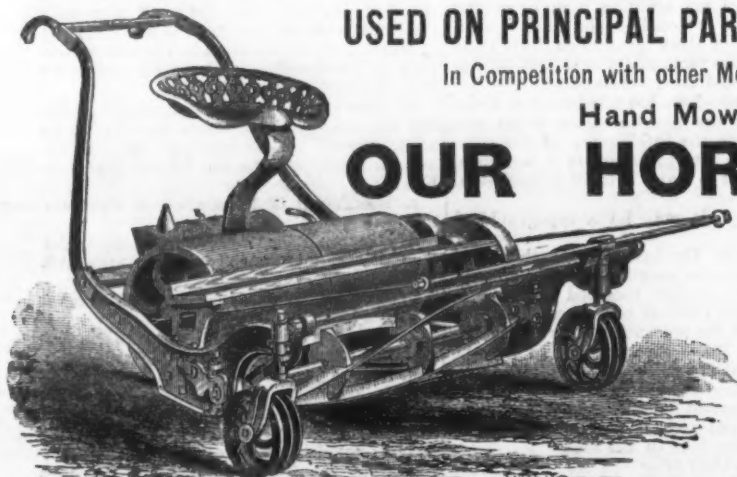


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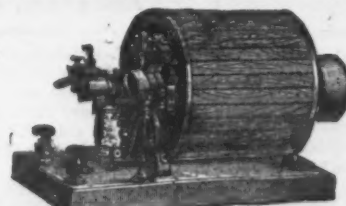
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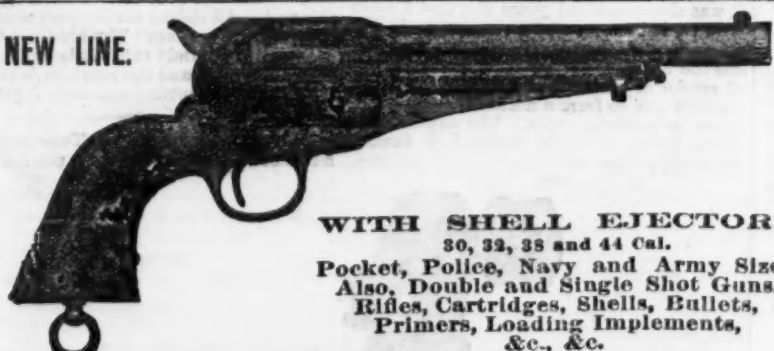
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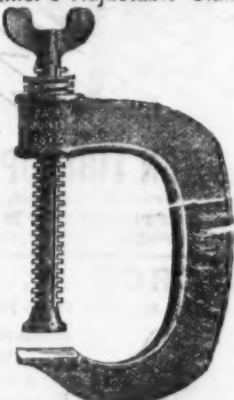
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Shackle secured to the Lock Box.

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to appointment, on May 5th received a large delegation of gentlemen, including Messrs. Kennedy, Miller, Long, Porter, Park, McCutcheon and Weeks, of Pittsburgh; Messrs. Wick and Wells, of Youngstown, Ohio; Mr. Bowles, of Cleveland; Mr. Bell, of Chicago; Messrs. Tyson and Swank, of Philadelphia; Messrs. Taylor and Highbridge, of Pennsylvania; and Representatives Errett, Kelley, McKinley, Watson and Townsend, representing the hoop iron and forged or rolled iron industries. It is known that the splayed hoop question had already been decided, and that the question whether forged car axles were a manufacture or hammered iron was ready for decision. In order to afford both sides an opportunity to be heard by counsel the secretary gave the gentlemen named the time they requested.

Mr. Weeks, on behalf of the manufacturers, opened the argument by stating that the questions involved related to two distinct forms of iron, and were both specifically mentioned in the tariff, the one as axles and the other as hoop iron. He then proceeded to show that they were so mentioned and consequently were not dutiable as the importers claimed under the "not otherwise provided for" clauses. That as the articles were named they should be so classified and rated. He then showed that the cutting to lengths, punching and splaying did not take it out of the category of hoop iron, and it had not ceased to be adapted to the purposes of hoop iron. In fact, the nearer a piece of hoop iron came to being a finished hoop, the more certainly it became hoop iron.

In regard to axles, he stated that the tariff provided the duties on axles, or parts thereof, to be 2½ cents per pound, and it was shown that what were imported as forgings for axles were known as axles in the trade. This point was sustained by a large number of affidavits. The importers claimed that they were not axles, as they were not finished. It was shown that these articles never were finished, but entered the market in a rough state, though known as axles, and were therefore classed in the schedules as such.

The attorney for the American Iron and Steel Association, Mr. S. Tyson, of Philadelphia, and Mr. A. C. Parsons, of Cleveland, also spoke at considerable length, following the same general line of argument as Mr. Weeks, but introducing many new points.

In the hoop iron case, the Secretary, having already rendered his decision, simply desired to give the importers an opportunity to be heard. As no importers appeared, the decision that splayed hoops are dutiable as hoop iron will stand.

The axle question came up on an appeal from a Chicago importer from the decision of the Collector at Toledo, who imposed a duty of 2½ cents a pound as a manufacture. An argument was filed in behalf of the importers, but no counsel appeared in person to vindicate their cause.

During the entire hearing Secretary Folger evinced the deepest interest, evidently determined to get at the bottom of the question. The manufacturers present were very favorably impressed, feeling assured that he would deal with the question intelligently and fairly. This decision will not be reached for some days.

SCIENTIFIC AND TECHNICAL.

Among the many interesting electric novelties which have been introduced from time to time, the invention of Mr. Schell is undoubtedly worthy of notice, its object being THE MEASUREMENT OF SPEED ON RAILWAYS. The wheels of the railway carriages close an electric circuit when passing certain places which occur at intervals of about 3000 feet. Successive marks are made on a slip of paper which passes through a Morse writer at a speed of from 1½ to 2 inches per minute, and the distance from mark to mark gives the speed of the train. The general arrangement may be thus described: By means of a rod of iron about 1¼ inches in diameter, the carriage wheels depress a pivoted piece of steel turning a bell-crank on a stout post clear of the track. The bell-crank lifts a vertical rod against the action of a spiral spring, and at its upper end this rod makes contact between two springs in an electrical circuit. This arrangement was largely introduced; but although many alterations were made, it was practically a failure, from the breaking of the rods, the destruction of the contact pieces, &c. The new arrangement, which works well, is quite different. The short end of a lever is placed underneath the rail, the other end being supported by a cord, which passes over a pulley and carries a weight. Pressed against this pulley, and on a steel axis, is a contact piece, to which is attached a ball of metal, by means of a strip of German silver. The pulley and this are attached only in a frictional manner. If the pulley rotates it moves the contact piece only a short distance along with it, as there are two stops, and the silver strip makes electrical contact on either side to which it may swing. The pulley and contact piece are well supported on a girder attached to the sleepers, and a wooden box, which covers the whole arrangement, prevents the disturbing action of any external influences. By the passing of a train the rail is bent or shaken, so that the motion of the lever is sufficient to make the pulley move, and the frictional connection causes vibrations to be set up in the German silver strip and ball, which increase as each new wheel of the train passes over, until the contact is made. In practice it is found that the action is immediate and to be depended upon, whether the yielding of the rail is great or small.

At the beginning of the last decade the question of cutting coal by machinery seriously engaged the attention of coal owners. Several types of machines were proposed and tried, but, owing to their numerous defects, the attempt to introduce them was abandoned. Within the past few years, however, the subject has again been brought prominently to the front, and

THE "RIGG-MEIKLETON" COAL CUTTER, has been patented, and is made by a Scotch firm. The machine works upon the revolving-disk system, stands only 15 inches above

the rails on which it is mounted, and is well suited for thin seams. It leaves the floor perfectly level and smooth, ready for laying down the rails for the next cut. The proper adjustment of the disk, by means of screws specially provided, allowing the apparatus, which is moreover furnished with an improved dragging gear, to cut at any required angle. It is, further, very compact and simple in construction, and, with a view to increase still more the durability of the machine, the makers have lately substituted steel for cast iron in those parts which are subject to the greatest wear and tear. The machines have been used in seams of all thicknesses, from 20 inches up to 6 feet, and satisfactory results have been obtained in all cases. In one colliery in the West of Scotland an apparatus of this kind is said to have recently cut through a wall of hard coal, 147 yards long, in 3¼ hours. The expenses of working the machine, sharpening and renewing cutters, and general repairs, together with the wages of the attendant, are small, and the work of getting coal by this machine compares most favorably with hand labor.

Among the large number of rock drills which have, within the past few years, been placed upon the market, few seem to give more gratifying results than

THE CORNISH ROCK DRILL,

which is simple in construction and operation, compact and durable, and less liable to become disabled than many now in use. The apparatus consists of three cylinders, all cast in one piece, and in such a manner that they are parallel to each other, that is to say, there is a central or main cylinder between two side cylinders, the latter being of considerably smaller diameter than the former. The two side cylinders are designed to receive the screws and nuts employed for feeding purposes, and the outer surfaces of the two cylinders serve as guides for the cradle. By means of this arrangement the working cylinder is well protected from breakage. The machine may be operated by steam, air, or other suitable fluid under pressure, and for this purpose the main or central cylinder is provided with two inlet ports, between which an aperture is situated serving as an exhaust port and which receives a tappet of triangular form operating the slide-valve. This aperture extends entirely through the wall of the cylinder, and affords communication with the interior thereof, so that all back pressure upon the pistons is prevented, as any steam or other fluid which may pass the pistons will immediately escape through this aperture and be conducted to the outer atmosphere. A steam-chest is fitted upon the central cylinder, and in this chest there is a flat slide-valve having a small projection at each end, which projections move in and out of corresponding recesses in the walls of the steam-chest as the machine works, each recess being provided with a small steel washer and an india-rubber buffer, so as to take off all jar of the slide-valve. One end of the aforesaid tappet enters a recess in the underside of the valve, and the valve is thus operated as the tappet oscillates on its pivot. The piston rod, to the outer end of which the tool is secured, is provided with three pistons, thus equalizing the wear throughout the cylinder. The pistons have rounded edges and are forged in one piece with the rod. The central piston operates the tappet which moves the slide-valve. The pistons and rod are rotated by means of a twisted bar, which works through the rear piston and into the piston rod, and through the upper or rear cylinder cover, upon the outside of which there is a ratchet-wheel and pawls. The pistons and rod may be rotated by hand or automatically by putting the pawls out of or in gear with the wheel. When the rotation is to be effected by hand the pawls are thrown out of gear, and a crank handle is placed on the outer end of the twisted bar, and thus the rod and piston may be rotated as desired. The cradle and guides which fit upon the outside of the small cylinder are made in separate pieces, so that any wear of these parts may be taken up or compensated for. The two screws for effecting the feeding of the machine are made with left-handed threads and work into the side cylinders through nuts at the rear end thereof. The unthreaded portion of the screw rods pass through a bridge-piece or extension of the cradle, and the outer end of each screw rod is furnished with a toothed wheel, which gears with a central wheel whose spindle is secured to the rear of the extension; a cranked handle is attached to the spindle of this central wheel, or to the end of the screw rods, and by rotating this handle the machine is moved forward. The upper cover of the cylinder serves to keep the feed-nuts in their place. At the competitive trials in connection with the Mining Institute of Cornwall, England, the speed of working was 20½ per cent. greater with the Cornish than with the Eclipse drill, and 76 per cent. greater than with the Barrow drill, the figures below giving some of the results obtained:

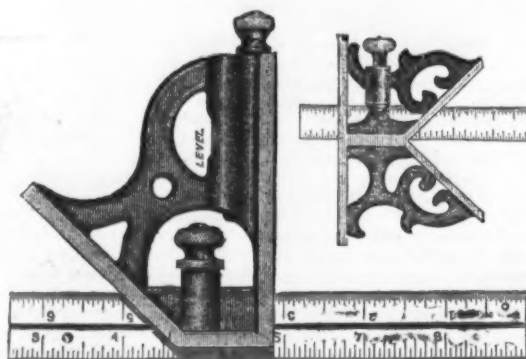
	Diameter of cylinder.	Depth bored.	Time boring.	Cubic inch ground out per min.	Mean pressure, lbs. per sq. inch.
	Inch.	Inch.	Min. Sec.	Inch.	Lbs.
"Cornish"	3½	13½	2 10	16.4	61
"Eclipse"	3½	11½	2 35	13.6	62
"Barrow"	4	8½	2 15	9.3	62

It is reported that a French gentleman, M. Bottelier, has made

A NEW TELEPHONE, which consists of a cylindrical copper box, about 5 inches in diameter and 2 inches high, in which the different parts are placed, and covered with a lid having a hole in the center. A mouthpiece is fixed near this opening, and the emitted sounds strike a vibrating plate screwed to the lid. The vibrations act on a magnet suspended to the sides of a box by three steel wires, the tension of which can be regulated at will. Owing to the elasticity of the wires the magnet may oscillate slightly in the same direction as the vibrations of the plate by which it is attracted, and as the magnetic action increases proportionately to the square of the distance, the amplitude of the oscillation increases until the tension of the wires, on the one hand, and the elasticity of the plate, on the other, equilibrate the attraction.

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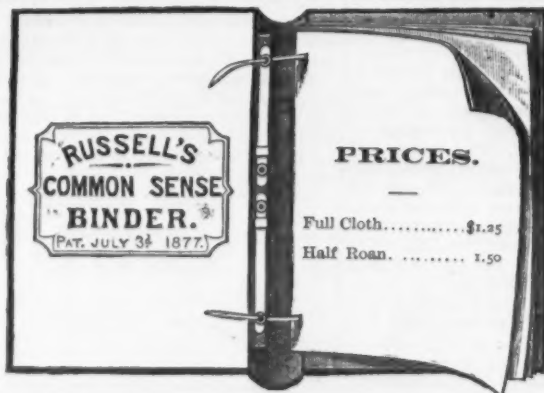
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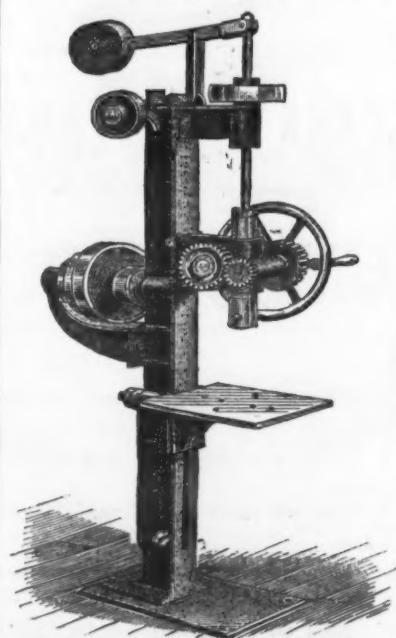
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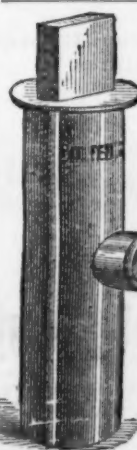
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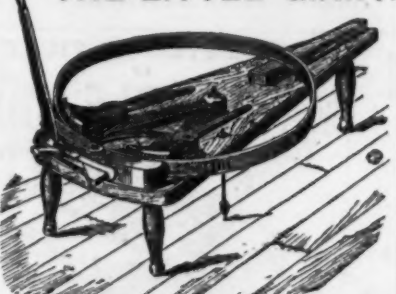
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Prof. R. Galloway, of Dublin, proposes the following method of

ASSAYING FUEL.

being, probably, superior in some respects to that ordinarily employed by analytical chemists. The only apparatus required is a furnace, a balance, a large porcelain crucible, a clay crucible and some pieces of charcoal. The porcelain crucible, which should, when half full of coal, contain about 500 grains, is first carefully weighed, and is then charged with exactly 500 grains of the sample in the form of powder. The bottom of the clay crucible is covered with a layer of pulverized charcoal, upon which the smaller porcelain crucible is placed. The space around and above the latter is then packed with small pieces of charcoal, from which the dust has been removed by sifting, and the lid of the clay crucible is finally placed in position. The porcelain crucible is also provided with a tightly fitting cover. The charcoal serves two purposes—it keeps the smaller crucible in position, and what is more important, it prevents the oxygen of the air gaining access to the sample of coal. The clay crucible is next placed in the furnace, well covered up with coke, and kept at a good red heat for

to U shape, and traversed by a rapid current of cold water—its lighting power is considerably weakened, being reduced to a luminous point, even with a current of from 50 to 75 large Bunsen elements. The arc is then very unstable; the least puff of air will extinguish it, and it will not inflame paper at 1-5th to 1-6th inch distant. The arc becomes a luminous globe vibrating between the electrodes, and resembles a liquid drop in the spheroidal state. The quantity of ozone developed appears to be increased. Notwithstanding the cooling of the electrodes, the arc is colored slightly green, proving combustion of the copper.

New Lathe and Drill.

The accompanying illustrations represent a new power drill and an improved engine lathe, now being offered to the trade by R. W. Rexford, No. 11 North Sixth street, Philadelphia. The drill is recommended by the maker as filling a want long felt for a medium-size tool of high standard at a low price. As represented in the engraving, it stands 22 inches high and weighs 27 pounds. In capacity it drills to center of 5 inches and



New Engine Lathe.—Built by R. W. Rexford, Philadelphia.

an hour. At the expiration of this time it is removed from the fire, allowed to cool without being disturbed, and when quite cold the outer lid is taken off, and the charcoal which covers the porcelain crucible carefully removed. The latter is lifted out, adhering fragments detached, and the crucible with its contents is then weighed. The weight thus obtained, less the weight of the crucible, gives the weight of the coke, and as this is yielded by 500 grains of the sample, it is easy to calculate the percentage. The volatile matter is obtained by differences, or, in other words, by the amount lost during the experiment. Suppose, for instance, the coke weighs 250 grains, this is 50 per cent.; there has consequently been a loss of 250 grains, and the volatile matter is therefore also 50 per cent. If the coke is 60 per cent., the volatile matter is 40 per cent., and so on. The porcelain crucible, after the experiment, will be quite black, but this does not materially affect its weight.

At a recent meeting of the Physical Society, England, some interesting experiments were exhibited, illustrating

THE FORMATION OF FOGS.

It was shown several years ago that a mere reduction of temperature or pressure in the atmosphere might not give rise to fogs, unless the air were pervaded by solid particles of smoke or certain gases, such as sulphurous acid gas, to form a nucleus for the water vapor to condense upon. The experiments above mentioned were designed to demonstrate this. The lecturer, for this purpose,

The Color of Water.—Two theories are advanced to explain the blue color of water



New Small Power Drill.—Built by R. W. Rexford, Philadelphia.

had arranged a bulbous glass flask connected with an air pump, and containing a small quantity of water. The beam from an electric lamp could be thrown through the flask so as to illuminate the interior. The experimenter first admitted some of the mote-filled air of the room into the flask, and by partially exhausting it a thick fog was produced, but on washing out the motes by agitating the water, the fog became far less appreciable. A small quantity of smoke introduced into the flask produced a thick fog; so also did the fumes from a piece of burning sulphur, and even a platinum wire, rendered incandescent by an electric current, gave off sufficient solid particles of dust or other matter to produce a fog. The inference is that, even with gas grates and stoves, fogs will prevail, though they be of a lighter color and less dense than with coal fires.

Experiments were made some time since which strikingly illustrate the ACTION OF COLD ON THE VOLTAIC ARC. When the latter plays between two metallic electrodes—for example, of copper tube bent

when seen in large masses, one, held by Professor Tyndall, being that small solid particles suspended in the water do not reflect the lower or red rays of the spectrum. According to the other theory the color is due to the absorbent action of the water itself on the white light before and after reflection by these particles. The results of experiments made by Mr. John Aitken, and presented to the Royal Society, England, show that the latter theory is probably the more correct one. The greater the number of white reflecting particles the greener the water appears to be, and hence the gradual deepening of the green to blue as the shore is left. The waters of Lake Como owe their darkness to the absence of reflecting particles, as Mr. Aitken ingeniously proved by scattering finely-divided chalk in the center of that lake, thereby producing a very brilliant blue. The brilliancy depends on the color of the particles, and is greatest with white particles. Among coral reefs, which are generally strewn with white sand, the water also takes a very brilliant blue or green. The dull tinge of English river waters is due to the

dingy character of the suspended silt; but springs have often a bright blue color owing to the whiteness of the chalk suspended in them.

INDUSTRIAL ITEMS.

MASSACHUSETTS.

In the United States Circuit Court of Massachusetts, in the suit of William Rogers Mfg. Co. vs. Rogers & Spurr Mfg. Co., Judge Lowell has made an interlocutory decree for the complainants, who asked for an account, and an injunction restraining the defendants from stamping the word "Rogers," or "Rogers & Son," on silver-plated table-ware. The complainants were given an opportunity to go before a master and submit special proof of profits derived from the use of the name Rogers. The court granted an injunction against the defendants, with costs and nominal damages.

One of those pleasing little episodes in life which are long remembered, occurred a short time since at Fitchburg, Mass., Mr. S. W. Putnam being the innocent victim. Mr. Putnam was notified during the day to remain at home for the evening, as he might expect a business call. In the meantime the workmen employed by the Putnam Machine Co., to the number of more than 200, assembled in a public hall and deputed one of their number to bring the victim before them. Mr. Putnam was found at his home and was notified that his former shopmates desired his presence. No explanations were offered until he reached the hall, when Mr. John L. Blodgett, of the committee of arrangements, revealed the mystery in a short speech and presented Mr. Putnam with an elegant and costly diamond pin. This token of sincere friendship was acknowledged by the recipient as soon as he could recover from his surprise. The jewel weighs $1\frac{1}{2}$ carats and is very clear, white and brilliant.

The Bridgewater Iron Company was the purchaser of the Parker Mills, sold by public auction last week, comprising all the lands, mills, tenements, machinery and entire property in Wareham and Providence of this corporation. It is not generally supposed that this company intends to operate the works.

The Morgan Silver Company, of Boston, with a capital of \$16,000, for the manufacture and sale of plated ware, has been organized.

The new building of the Pairpoint (Silver) Mfg. Co., at New Bedford, is completed and ready for the machinery. It is 150 feet long, and being an addition to the original building, the entire structure is now 270 feet in length by 40 feet in width. The new part is four stories in height, while the original one is but three. The company also has a wooden building connected with the main building on the north, which is 118 feet long, 40 feet wide and three stories high.—*Boston Commercial Bulletin.*

E. T. Jenks, of Middleboro', has finished an order for a lot of his patent locks to be used in the palace of the King of the Sandwich Islands.—*Boston Commercial Bulletin.*

Williams & Lowry, of Newburyport, are building a very heavy stamp battery for crushing ores. It has six stamps, each weighing 750 pounds. A second battery is also under way at this place, which will make the fourth they have built.

NEW HAMPSHIRE.

The Underhill Edge Tool Co., at Nashua, are enlarging their factory, and they turn out 900 axes daily and employ 125 hands.

CONNECTICUT.

The Bradley & Hubbard Mfg. Co., at Meriden, who now have acres of brick factories, are about to add another building, to introduce brass rolling as a new department.

The Yale Clock Company, New Haven, have orders for 1000 pendulum clocks in bronze case, each from Tsien-Tsin and Hong Kong.

NEW YORK.

The Chicago Steel Horseshoe Co. have been so well supplied with orders by their New York agents, Peck & Goddard, 60 Liberty street, that they have been compelled to put up a number of new machines.

The Iowa Barb Wire Co., 99 John street, send us a copy of a little publication called the *Barb Wire World*, which sets forth the merits and advantages of barb-wire fencing. It is clearly illustrated and contains information of value to dealers and consumers.

The works of the Washington Glass Works, at Ithaca, were burned to the ground on May 2d, throwing 125 men out of employment, and causing a loss of over \$50,000, but half of which is covered by insurance. The works will be rebuilt.

The Knowles Steam Pump Works, of New York and Boston, have issued a handsomely illustrated catalogue setting forth the advantages of their pumps and condensers, and giving the prices and dimensions of their manufactures. It is claimed by them that their improved air pump and condenser, when used in connection with any steam pump, will insure economy of fuel, combined with simplicity and effectiveness. Special advantages are claimed for their compound air pump and condenser, the steam operating the pump being thoroughly utilized before exhausting into the condenser. Cranks, rocking arms, journals, connecting rods, slides, &c., which are subject to derangement and to lost motion, are entirely dispensed with in this apparatus, and by means of a simple three-way valve, placed on the exhaust pipe, the steam may at any time be exhausted into the atmosphere instead of the condenser. Every machine is thoroughly tested and guaranteed before leaving the works and orders are satisfactorily executed. Estimates and illustrated catalogues are furnished on application.

PENNSYLVANIA.

Geo. L. and Wm. C. Reis, of New Castle, have purchased the interest of their partners, Peter and G. A. Kimberly, in the firm of Reis Bros. & Co., which firm is now dissolved. Messrs. Reis will continue the business under the firm name of Reis Brothers.

The separator department of the Geisler Mfg. Co., of Waynesboro', was entirely destroyed by fire on May 1st. The loss was over \$50,000, and only partly insured. The fire broke out at 6.30 p. m. in the erecting building of the separator department, and

communicated rapidly to the machine, blacksmith, pattern and paint shops, all of which were destroyed, with their contents. The origin of the fire is unknown, but is supposed to have been caused by sparks from an engine falling among some shavings in the erecting room. Work on the new buildings will be commenced as soon as possible, and no workmen will be thrown out of employment.

It is announced that, at the earnest solicitation of the directors of the Dunbar Furnace Company, Major A. B. DeSaules has consented to resume charge of their furnaces in his former capacity of vice-president and superintendent.

A few days ago one of the large furnaces at the Lochiel Iron Works, Harrisburgh, chilled. When work was begun to clean it out, preparatory to again blowing it in, a solid mass of iron at least 40 or 50 tons in weight was encountered. Chiseling, sledging, and other modes were resorted to in order to break the metal so that it might be dislodged, but they were unsuccessful. It was only after the repeated use of dynamite that the iron was broken, and then into but three pieces. Each of these weighed a number of tons, and it was with great difficulty they could be taken out. One of the columns to the furnace was shattered by the force of the dynamite, and it will be some time before the furnace will be repaired sufficiently to be put in operation.—*Reading Eagle.*

The Colebrook Furnace is turning out 407 tons of iron per week.

The Maiden Creek Iron Company are running only part time in their skelp iron department, on account of needed repairs, trade also being rather dull. Their hoop mill is, however, running double turn.

It is now announced that Canonsburg has raised the amount necessary to secure the erection of a rolling mill in that place, and that work will commence at once. A large and fine sheet mill, a Siemens open-hearth plant, and other costly improvements are confidently prophesied by the projectors.

The E. & G. Brooke Iron Company turned out last month at their Birdsboro' works 18,218 kegs of nails, and shipped during the same period 17,000 kegs. The figures show a decrease from March figures, but this is accounted for by the fact that the works were out of iron for some days.

The electric lights at the Bethlehem Iron Works are almost completed and in a short time will be in working order. The engine required to furnish the power is 75-horse-power.

A charter has been granted to the Keeley Stove Company, of Columbia, with a capital stock of \$200,000. The shareholders, numbering 171, are nearly all residents of Columbia.

PITTSBURGH AND VICINITY.

The puddling department of Graff, Bennett & Co.'s Millvale mill (in the old end) has started, with 12 single furnaces on with the gas furnaces. Nine single furnaces are still off. The machinery works very well. The south end is still unfinished, waiting for the iron to put the shed up. The Danks furnaces are not ready, and will not be for some time yet. The plate and vertical mills are on double turn, with two heating furnaces on each mill. The reversing mill is on single turn; bar mill on double, with two heating furnaces. The other mills are not ready as yet.

There is every indication that the Siemens-Anderson Steel Works will resume work before long. The leading creditors have formed a syndicate to buy in the works when they are sold to satisfy the Fetterman, Jamison, Duncan and other mortgages, which take precedence of all other claims. The syndicate will then operate the works, it is said, through some of its members, among them being A. M. Byers and John Scott.

The contest between the Cass and Bennett-Scott factions of the Manchester Iron and Steel Company was before the United States Court last week. It was the suit of the Cass officers of the company against the M. & B. Bank to recover \$2955, which the bank paid out of moneys of the company as dividends to stockholders, who presented checks drawn by John F. Scott, then treasurer of the company. The present officers claimed the dividend was illegal, and yesterday obtained a verdict for \$3028.77.

ILLINOIS.

The Stover Mfg. Co., Freeport, are to erect an additional building to their present one, 40 x 58 feet, also add new machinery for manufacturing wind engines and general machinery.

The Freeport Malleable Works will build an addition of 250 x 100 feet to their present establishment and employ 50 additional hands.

The Perfection Window Cleaner Co., Chicago, organized with a capital of \$40,000, have been compelled, on account of the large increase in their sales, to remove their salesroom to No. 232 La Salle street, where they will have extra facilities for supplying the trade. They have, during the past year, made contracts with firms in England, Australia and France, to handle their goods. These cleaners are made from carefully selected material and effect a great saving in time and labor.

Messrs. H. W. Hill & Co., Decatur, have in nine years sold over 300,000 Ringers and 100,000,000 triangular rings.

Messrs. W. F. & John Barnes, Rockford, will erect new shops having a floor of about 35,000 square feet; they are now employing 75 hands steadily on full time. Their present shops are entirely inadequate for the amount of work being done.

The Gray Iron Co., of Chicago, manufacturers of Niles's Patent Mortise Door Knobs and Locks and other hardware specialties, have changed the name to the Chicago Hardware Mfg. Co.

The Excelsior Iron Works, Chicago, are working one and a half turns every day and have all the work they can do. They report that the outlook for trade is very good.

The Northwestern Horse Nail Company have let the contracts for their new building at Brighton, and are at present engaged in putting in railroad connections.

The monthly output of Calumet Iron and Steel Company's Works is estimated at 22,000 kegs of nails, 1800 tons of bars and

3500 tons of pig iron. The company are at present employing 900 men, the largest number they have ever had.

WISCONSIN.

The Empire Cross Spring and St. Julien Gear Co., of Janesville, manufacturers of the St. Julien Gear, Magner & Thomas patent, August 10, 1881, are running their works to their full capacity, employing constantly 22 to 25 hands. The St. Julien Spring is made from the best of steel, and is meeting with favor wherever introduced.

The Single Center Spring Co., Janesville, report that orders are very pressing. They will shortly add additional space to their works, the present being too small for their needs.

The Champion Horse Nail Co., Appleton, will shut down shortly to make necessary repairs and put in new machinery. They have been compelled to double their capacity on account of the increase in their trade.

The Novelty Mfg. Co. Milwaukee, manufacturers of the broad wheel barn-door hangers and other hardware specialties, have just completed an addition to their present works, 40 x 50, and are running to their utmost capacity.

KENTUCKY.

The American Wire Nail Co., Covington, send us a very handsome illustrated catalogue of their goods which is certain to be of interest and value to all who handle this class of nail. Everything is shown in full-sized cuts, from the wire nail, which looks like a miniature pin 3-16th inch long, to a round spike 8 inches long.

OHIO.

The Tricycle Mfg. Co., of Springfield, have made large additions to their factory and machinery, and are confident that they will be able to speedily execute all incoming orders. Among the various productions of this establishment the manufacturers desire to direct attention to their wheelbarrows, which they claim to be of superior strength, lightness and durability. The same advantages, besides good workmanship and pleasing appearance, are claimed for their tricycles and bicycles, which are in extensive use.

The Cincinnati Screw and Tap Company, corner Pearl and Plum streets, have issued a neat catalogue, containing the prices of the different kinds of taps and dies manufactured by them. They have considerably increased their facilities, and are prepared to fill orders with promptness and dispatch. Special attention is called to their machineists' nut and pipe taps, as well as to their blacksmiths' taps and dies of every description.

Grant Furnace blew in last week and is doing very well making her usual output.

Ground has been broken and workmen are busily employed on the foundation of the new glass works at East Liverpool. The site, as is generally known, is just across the river from the Flint mill. The capacity of the works at the outset will be one 14-pot furnace.

Monitor Furnace was to have blown in this week. She will probably be run on cold blast.

WEST VIRGINIA.

Mr. F. J. Hearn, general manager of the Riverside Iron Works, Wheeling, states that the blast furnace under his charge, which is 75 feet high and 16½ feet in diameter at the bush, has made in one day a product of 140 gross tons of pig iron; in five consecutive days, 634 tons; in seven consecutive days, 845 tons; in 31 consecutive days, 3567 tons.

It is announced that the Klonan mill, at Moundsville, will not resume operations until the spike machines are received and put into position, and all other necessary work about the concern completed, necessary to enable the mill to convert the product of the boiling furnaces into spikes, which will require probably six weeks' time.

ALABAMA.

On the 5th of April a meeting of the stockholders of Tecumseh Iron Works, held at Tecumseh, voted to increase the capital stock to \$200,000. A note from General Warner, president and manager of the furnace, to the editor of the *Tradesman*, under date of April 18th, says: "We enter to-morrow on the eighty-third month of continuous blast on one hearth, without once blowing out in the entire period." That is, Tecumseh had been in blast on April 19th, six years and ten months. We are not quite sure, but we believe this to be the longest continuous blast ever accomplished in this country. The furnace is now making as much and as good iron as it ever did, and much more and better iron than was the output of the first year or two's operations.—*Chattanooga Tradesman.*

MISSOURI.

The Helmbacher Forge and Rolling Mill Company have started up all their hammers. Jupiter Furnace is still out of blast.

MICHIGAN.

The Vulcan Furnace Company is the name of a new Detroit corporation which will put up a large blast furnace at Newberry, on the line of the Detroit, Mackinac and Marquette Railroad, this season. A large force of laborers and mechanics is already at work, preparing the foundations and putting up the smaller buildings. It is expected that the furnace will be ready to go in blast by next September.

We hear that a charcoal furnace may be erected at Hermansville by C. J. L. Meyer. No. 2 stack of the Pioneer Furnace has been blown out for a new hearth and relining, having been in continuous blast for something over a year.

MARYLAND.

The Walker Horseshoe Company, which was recently organized in Baltimore for the manufacture of Walker's well-known hammered horse and mule shoes, have purchased about five acres of land from the Consolidated Real Estate and Fire Insurance Company, upon which it is proposed to erect suitable buildings for workshops. The property is situated on Locust Point, about 80 feet south of Fort Avenue, between Ludlow and Porter streets, and runs to the water line. The company will at once contract for the erection of their buildings, consist-

ing of the manufactory shoeshop, which will be 75 x 180 feet; storage warehouses, for kegs, shoes and other necessary structures. These will be built of red brick, with corrugated iron roofs, and will occupy nearly all of the five acres purchased. The machinery, tools, &c., have already been bought. The entire improvements will cost \$200,000. The Walker horseshoes were formerly manufactured in Troy, N. Y. Mr. Walker, the patentee, was induced to remove here owing to the superior advantages which Baltimore offers for carrying on this branch of the iron trade. The officers of the company are: President, Samuel G. B. Cook; vice-president, W. G. Atkinson; treasurer, Oliver C. Zell; secretary, C. P. Faine; superintendent, James T. Walker.

CALIFORNIA.

Articles of incorporation of the Pacific Iron and Nail Company were filed in San Francisco, April 23. The company propose to erect at a suitable locality, at or near San Francisco, rolling mills and furnaces, with all the plant and machinery necessary for the manufacture of iron in such forms as may be hereafter determined; also to build and operate a manufactory for the production of nails; to build wharves, boats and barges; to purchase, locate and work iron and coal mines and timber lands, together with such water rights and water powers as may be proper for the working of the same; to import, buy and sell iron and coal, and such other material as may be necessary for the proper conducting of the business, and to manufacture kegs and boxes for packing purposes. The directors are as follows: W. J. Houston, San Francisco; G. T. Walker, Omaha; P. A. Wagner, San Francisco; W. F. Perry, Oakland; W. F. Mau, San Francisco; T. R. Hayes, Oakland; N. J. Wilson, A. M. Starr, Asa Harker, San Francisco; E. H. Morgan, P. C. Coogan, Oakland. The capital of the company is \$500,000, divided into 5000 shares. The following amounts have been subscribed: W. J. Houston & Co., \$1000; W. J. Houston, \$10,000; W. F. Perry, \$1000; Geo. T. Walker, \$10,000; Thomas R. Hayes, \$10,000; N. J. Wilson, \$5000; Edward H. Morgan, \$5000; H. J. Sadler, \$5000; R. A. Wagner, \$10,000; W. F. Mau, \$10,000; Asa Harker, \$5000; A. M. Starr, \$10,000; E. Wallace, \$10,000; T. C. Coogan, \$1000; total, \$93,000.

METALLURGICAL NOTES.

THE USE OF ELECTRICITY IN THE REDUCTION OF ZINC ORES.

Although electricity is still too dear to be extensively employed for all purposes, it can be advantageously substituted for coal and heat in the reduction of zinc ores. It may be employed in three different methods, which differ chiefly in the nature of the acid which is used as a solvent. The ores do not require much preparation; the calcine need not be calcined, and it is not even necessary to separate the lead or the calcareous gangues. After having been treated with sulphuric acid, the ores are placed in large basins and the sulphate of zinc is dissolved in water. This solution of zinc salt is allowed to pass through a series of basins, where it deposits part of the zinc in a metallic state, due to the action of electricity, and the liberated acid may be used upon new supplies of ore. The lead, silver and other insoluble matters are collected in the residue, and the iron, which is precipitated upon the lead anode, falls to the bottom of the basin. If the electricity is produced by steam-power, the quantity of coal which is required for a given amount of zinc is almost precisely the same as would be required for the same amount of ore in the old methods. The treatment can be conducted at the mine, thus avoiding much of the expense of transportation.

MALLEABLE BRONZE.

Mr. Leon Léfrange, of Paris, has made an invention by which the alloy of copper and tin, and especially gun metal, has such qualities imparted to it which are essential to enable it to bear rolling, and subsequent application to the manufacture of various articles. When bronze is being cast, the qualities proper to the two metals of which the alloy is composed are obliterated by the presence of the oxygen abstracted from the atmosphere by the fused metals, but according to his process, he frees them from the objectionable ingredient by introducing into the metallic bath a substance which has great affinity for oxygen—such as manganese or phosphorus—in a quantity which is just sufficient for absorbing the oxygen and carrying it off in combination to the surface of the bath, which is the reverse of what has hitherto been done—that is to say, adding a larger dose of manganese or phosphorus intended to harden the metal. The deoxidation of the bronze which he effects is analogous to that which is applied to iron in the well-known Bessemer process, in which, at the end of the operation, when the iron is penetrated by oxygen, in consequence of the energetic action of the air introduced for the purpose of oxidizing the foreign matters, manganese is introduced in the proportion required for being combined with the oxygen, and for carrying it off into the scoria. But he is very careful not to introduce a quantity of manganese or of phosphorus which would be sufficiently considerable to be taken into account in the alloy, as has been done by those who have heretofore operated upon castings. The manganese is introduced into the metallic bath in the state of cupro-manganese previously combined, or phosphore of manganese. Phosphorus, which is in many cases preferred to manganese, may be introduced into the bath of copper, tin or bronze in its natural state, although it may be successfully employed in the form of phosphore of copper or manganese previously prepared. The bronze thus deoxidized becomes remarkably fluid when in fusion, and acquires, when cold, a malleability which allows it to be rolled, and then stamped, wrought, or otherwise worked like copper and brass. It possesses in the highest degree its natural qualities of elasticity, tenacity and resistance to oxidation, a fine and close grain, and a color resembling that of gold, which renders it capable of advantageously replacing steel, tin, copper, and its various alloys with zinc. When a bronze of greater hardness and tenacity is required, Mr. Léfrange adds to the alloy nickel, bromine, tungsten, wolfram, or

other metals, which harden it without preventing its being malleable. Bronze thus produced is malleable if worked in a particular way; that is to say, the molten alloy must be cast in plates in copper molds and annealed before being rolled. It is rolled cold, and annealed after each subsequent operation. Bronze made according to this process is suitable for the manufacture of large and small bells and gongs, &c., which have hitherto been made of more expensive material.

THE PERMEABILITY OF PLATINUM.

During a series of experiments on the halogens made by Mr. H. Zueblin with the object of finally settling the question whether chlorine is to be considered as an element or as some oxygen compound, the curious fact was noticed that a platinum foil, perforated by means of a very fine steel pin, was impermeable to chlorine in common temperature, while air would easily pass through. It is a well-known fact that platinum in a glowing state, with its molecular pores, is permeable to hydrogen, but not to air. Mr. Zueblin's researches appeared at first to confirm the often advanced theory that strongly heated pure chlorine would yield oxygen. On further and most careful investigation, however, it became clear that the traces of oxygen were due to the use of Bayeux porcelain; no traces of oxygen whatever could be discovered when Berlin porcelain replaced the Bayeux tubes, the reintroduction of which caused the reappearance of oxygen.

THE VOLATILITY OF METALS.

Dr. Duruy, of this city, whose blow-pipe furnace we recently illustrated, claims that, by the intense heat produced in his furnace, metals, such as gold and silver, may be readily volatilized and obtained directly from the ores. This again directs some attention to the question relating to the volatility of metals, implying a waste or saving of about 10 per cent. of all the gold and silver smelted during the year. An exchange, in dwelling upon this question, states that iron is non-volatile, while lead and zinc are vaporized at a red heat. Gold alone is considered non-volatile at even a white heat, but chlorine, which combines with it at a temperature of some 4000°, renders it so volatile that its vapors can be carried into a cooling chamber and easily condensed. It is found by furnacemen that silver and lead when smelted together are carried off to the extent of from 10 to 30 per cent., even at an ordinary furnace heat, and it is becoming a serious question around Leadville how to overcome the effect of lead poisoning from the numerous furnaces. It is stated semi-officially that Hill's Smelting Works will melt 1000 tons a day at a profit of \$5,000,000 a year, even with a loss of 19 to 20 per cent. calculative loss by metals going off in vapor. It is, however, perfectly needless to lose even 10 per cent. by volatilization, as by proper arrangements the vapors could all be collected and utilized, and poisonous vapors entirely avoided. Since the volatility of metals appears to be an established fact, the adoption of proper appliances to meet existing requirements will be only a question of time and the distillation of metals will be as easy as the distillation of ordinary liquids.

THE STRENGTH OF WROUGHT IRON AND STEEL AT HIGH TEMPERATURES.

Some time ago the *Journal of the Franklin Institute* presented an article entitled "Experiments on the Strength of Wrought Iron and Steel at High Temperatures," which, though perhaps containing no original matter, is an interesting summary of previous investigations. Three kinds of metal were tested, viz., fibrous iron having an ultimate tensile strength of 52,464 pounds, an elastic strength of 38,280 pounds, and an elongation of 17.5 per cent.; fine-grained iron having for the same elements values of 56,592 pounds, 39,113 pounds, and 20 per cent.; and Bessemer steel having values of 84,826 pounds, 55,029 pounds, and 14.5 per cent. The mean ultimate tensile strength of each material expressed in per centum of that at ordinary atmospheric temperature, is given in the annexed table, the last column of which contains, for purposes of comparison, the results of experiments carried on by a committee of the Franklin Institute in the years 1832-36:

Temperature Fahrenheit.	Fibrous Iron. Per cent.	Fine-grained Iron. Per cent.	Bessemer Steel. Per cent.	Franklin Institute. Per cent.
0	100.0	100.0	100.0	95.0
100	100.0	100.0	100.0	100.0
200	100.0	100.0	100.0	100.0
300	97.0	100.0	100.0	100.0
400	95.5	100.0	100.0	100.0
500	92.5	98.5	98.5	104.0
600	88.5	95.5	95.5	99.5
700	81.5	92.0	88.0	92.5
800	67.5	77.5	44.0	75.5
900	44.5	57.5	36.5	51.5
1000	26.0	36.0	31.0	36.0
1100	22.0	30.5	26.5	...
1200	18.0	28.0	22.0	...
1300	16.5	23.0	18.0	...
1400	13.5	19.0	15.0	...
1500	10.0	15.5	12.0	...
1600	7.0	12.5	10.0	...
1700	5.5	10.5	8.5	...
1800	4.5	8.5	7.5	...
1900	3.5	7.0	6.5	...
2000	3.5	5.0	5.0	...

COPPER REFINING.

The ordinary method of removing impurities contained in commercial copper consists in melting the metal, agitating it violently, and thus bringing its several portions into contact with the oxygen of the air. This, however, has proved to be a very imperfect process, and is said to be inferior in many respects to that proposed by Mr. Claude Vautin, of North Fitzroy, Victoria. According to his method, oxygen alone or in combination with other gases (preferably in the form of atmospheric air) is forced through the molten metal, oxidizing the impurities which rise to the surface, and may be skimmed off. Mr. Vautin also proposes to introduce oxygen-producing solids into the metal to be purified. Metallic oxides that yield up a portion or a whole of their oxygen under heat will, when mixed with a suitable flux or reagent, form such oxygen-producing solids. By way of example, he mentions that one

IMPORTS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending May 10, 1882:

Hardware.

Baldwin Bros. & Co.
Machinery, 182, 52
Brown Wm.
Anvil, 2
Cases, 3
Baker Hermann & Co.
Cutlery and guns,
picks, 104
Curly J. & Bro.
Case, 1
Dodge Alfred,
Cases, 18
Dreyfus & Sachs
Case, 1
Drexel, Morgan & Co.
Arms, 67, 70
Field Alfred & Co.
Cases, 20
Anvil, 20
Casks, 2
Folsom H. & D.
Cases, 6
Graft Culley Co.
Cases, 20
Godfrey C. J.
Cases, 3
Hardier, Abraham & Co.
Cases, 11
Merchants' Dispatch Co.
Cases, 28
Montgomery & Co.
Cases, 2
Moore's Sons, J. P.
Arms, 35, 20
Moore's J. B. & Co.
Cases, 3
McCoy & Saunders,
Merchandise, 33
Osborn John & Sons
Champagne wires,
cs, 2
Schovierling, Daly &
Gales
Arms, 35, 29
Scott Wm. H.
Arms, 34
Taylor Thos.
Cases, 2
Thos. Herman & Co.
Ironware, 35, 1
Vom, Cleff & Co.
Hardware, 35, 13
Warburg Ed. & Co.
Machinery, 35, 17
Winchester Arms Co.
Cases, 4
Wiebusch & Hilger Co.
Cutlery & hdlr. pgs.,
10
Witte John G. & Bro.
Needles, 35, 2
Cutlery, 35, 3
Yale Geo. A.
Machinery, 35, 1
Order,
Cases, 3
Arms, 35, 2

Iron.

Alexandre F. & Sons,
Bars, 50
Bills, 50
Haring Bros. & Co.
1 lb. tons, 200
Scrap, tons, 250
Wire rods, coils, 940
Rail rods, bils., 353
Brown Bros. & Co.
Bars, 376
Wire rods, bils., 1000
Iron, bils., 256
Brookner & Evans
Netting, rolls, 121
Crocketer Bros.
Spiegel, tons, 379
Fig. tons, 204
Downing, Sheldon & Co.
Sheet, bils., 742
Elliot G. & Sons,
Ore, tons, 100
Hood D. C.
Mang. ore, bils., 4
Howard & Moore
Netting, rolls, 45
Knauth, Nachod &
Kuhn
Iron recipients, pgs.,
25
Lee James & Co.
Fig. tons, 204
Millikin & Smith
Wire rods, bils., 125
Wire, bils., 1239
Moore J. B. & Co.
Fig. tons, 120
Morton, Bliss & Co.
Rails, 310
Sack & Co.
Wire rope, coils, 2
Paxon & Seabury
Fig. tons, 50
Tillotson L. G.
Wire, coils, 831
Wilcox E. B.
Wire, csk., 1
Whitney A. R.
Bundles, 105
Wood, Nichol & Co.
Rods, pgs., 401
Order,
Pigs, tons, 383 1/2
Wire rods, bils., 664
Wire rods, pgs., 1279
Castings, cks., 200
Barrel hoops, bils.,
1000
Spiegel, tons, 1255
Spiegel, kg., 125, 125
Spiegel, 104,
Pigs, bils., 224

COAL.

The Coal trade remains in the dull, quiet state noticed one week ago. The only point relates to the continuance of half time at the mines during the remainder of the month, no decision having been arrived at officially, and it is intimated that some delay may have arisen from the absence of Mr. Gowen in Europe. Restriction, however, may be considered a necessity. As to prices, the remark is that "we come as near to circular rates as we can. Sometimes we get them, and sometimes we don't; more frequently we don't." In the Eastern trade around the Capes there is rather more business in manufacturers' sizes, which some darkly hint may be owing to a shading of prices. In Anthracite and Bituminous alike the stagnation is mostly in the domestic sizes. It does not appear that there is any material accumulation of stock, as shippers complain that they could do more business if the production was larger.

In Bituminous Coal there is no change. The price is quoted about \$4.50, f. o. b. Clearfield tonnage is large, while in the Cumberland region there are as yet no signs of resumption. The Westmoreland is sending Coal to Baltimore for foreign shipment, an unusual proceeding, caused by the Cumberland strike.

Eastern freights are quoted \$1.15 to Boston and \$0.80 to Providence. Orders are being received quite freely and there are more vessels.

The total tonnage of Anthracite Coal from all the regions for the week ending April 29, as reported by the several carrying companies, amounted to 382,360 tons, against 681,425 tons in the corresponding week last year, a decrease of 299,065 tons. The quantity of Bituminous Coal sent to market for the week amounted to 79,668 tons, against 99,246 tons in corresponding week last year, a decrease of 19,578 tons. The total ton-

nage of all kinds of Coal shows a decrease of 652,658 tons, compared with the same date last year. The quantity of Coal and Coke carried over the Pennsylvania Railroad for the week ending April 22 was 217,715 tons, of which 158,722 tons were Coal and 58,993 tons Coke. The total tonnage for the year thus far has been 3,365,785 tons, of which 2,388,139 tons were Coal and 977,646 tons Coke.

Old Metals, Paper Stock, &c.

The purchasing prices offered by dealers are as follows:

Copper, heavy..... 1/2 lb. \$... @ \$0.15 1/2
Copper Bottom..... " " @ .15 1/2
Yellow Metal..... " " @ .10
Brass, heavy..... " " @ .11
Brass, light..... " " @ .09
Composition, heavy..... " " @ .15 1/2
Lead, heavy..... " " @ .04
Tea Lead..... " " @ .04
Zinc..... " " @ .03 1/2
Pewter, No. 1..... " " @ .09
Pewter, No. 2..... " " @ .09
Wrought Iron..... 1/2 ton \$6.00 @ 27.00
Light do..... " " @ 13.00
Stove Plate..... " " @ 13.50
Machinery do..... " " @ 17.00
Grate Bars..... " " @ 15.00
Electrotype plates..... 1/2 lb. \$0.04 1/2 @ .05
Stereotype plates..... " " @ .05
Small type..... " " @ .05 1/2

The prices current (prices paid by local dealers) for Rags, &c., are as follows:

Canvas, Linen..... 1/2 lb. \$3/4 @ 4 c
White Cotton, New..... " " @ 3/4 c
White, No. 1..... " " @ 3/4 c
White, No. 2..... " " @ 3/4 c
Second..... " " @ 1/2 c
Soft Woollens..... " " @ 1/2 c
Mixed Rags..... " " @ 1/2 c
Gunny Bagging..... " " @ 1/2 c
Butts..... " " @ 1/2 c
Kentucky Bagging..... " " @ 1/2 c
Book Stock..... " " @ 1/2 c
Newspapers..... " " @ 1/2 c
Waste Paper and Scraps..... " " @ 1/2 c
Kentucky Bale Rope..... " " @ 1/2 c

PHILADELPHIA.

Office of The Iron Age, 220 South Fourth st.,
PHILADELPHIA, May 9, 1882.

Pig Iron.—There is but little to add to our remarks of last week, the market in all its leading features being essentially unchanged. The demand is about equal to the supply, and, as a rule, furnaces are bare of stocks, especially in best grades of Foundry Iron. The future is as obscure as ever, and parties most likely to be well informed are still undecided what position to assume. The strength of the market at present is in Foundry Irons, but this is fully offset by weakness in the lower grades. Notwithstanding the number of orders taken from day to day, furnaces are not entering into anything like the amount expected at this season.

Consumers buy to cover immediate requirements, beyond which they cannot be induced to go. If it was absolutely certain that the demand could be maintained in its present proportions, there would be no reason to fear any decline in prices, but with midsummer near at hand, such anticipations are scarcely likely to be realized. It is this uncertainty that depresses the market. There is a general expectation of a good fall trade, but in the interim stocks of Pig Iron may increase and prices decline. Consumers have not sufficient confidence to contract for forward delivery, so that in effect the question of values is postponed for future development. As a rule, producers would be very willing to enter orders for delivery during the last half of 1882 at to-day's quotations, and for July and August would probably make concessions, but there is no demand of that kind, so that full prices are quoted and obtained for such lots as can be placed for prompt delivery. Prices vary considerably, according to brand, the range being from \$23.50 to \$25.50, at furnace, for No. 1 Foundry; \$21.50 to \$22.50 for No. 2, and \$21 to \$23 for Gray Forge. There is more weakness in medium and low grades than in others, favorite brands being scarce and in good demand at full prices. Gray Forge is somewhat inclined to weakness, and while good average Lehigh brands are quoted \$21.50 to \$22, bids of \$21 from good buyers would be likely to find takers. White and mottled Irons are particularly weak, and are offered at \$18 to \$20, at furnace.

Foreign Iron.—Bessemer is exceedingly dull, and with the exception of a few small lots for spot delivery, there has been nothing done. There are sellers at \$24 to \$24.50 for shipment, but buyers respond very slowly, and in fact, offers for large lots at any price are not easily obtained. It is likely that sellers would make concessions if there seemed to be a fair prospect of business; but absolute indifference appears to be the position assumed by leading buyers. Two or three small lots have been taken at \$24 to \$24.50, ex ship, New York, and the firmness in freights has a tendency to confirm holders in the determination to maintain prices.

Muck Bars.—The market is dull and prices again lower. Sales have been made at \$1.1, and business is rather slow at the reduced quotation.

Blooms.—There is a fair demand for the best makes, for which full prices are obtained. Other descriptions are irregular. Sales are made at about the following quotations, viz.: Charcoal Blooms, \$72.50 to \$75; Run-out Anthracite, \$60 to \$62.50; Scrap Blooms, \$52.50 to \$55; and Northern Ore Blooms, \$47.50 to \$50.

Bar Iron.—The market is in a very unsettled condition and prices hard to quote. The city mills quote 2.75, but get very little business, as supplies can be obtained from other sources at considerably lower prices. Several orders have been placed with Western manufacturers at about 2.55, delivered, for what they claim to be first-class Refined Iron, and so long as this can be done, there is little chance for local manufacturers at the higher quotation. We understand, however, that 2.65 would keep a good deal of business in the city, so that there is probably some little doubt as to the quality of the 2.55 Iron. The outlook is very uncertain, and the various conflicting influences difficult to reconcile. Manufacturers are barely obtaining cost for their output, and are naturally looking for some means of economizing, especially in view of the fact that lower prices seem inevitable. The position is such that there really appears to be very little margin for a reduction in the items of cost, but it will have to come. Manufacturers cannot obtain more than the market will afford,

neither can they continue doing business at a loss. It follows, therefore, that if selling prices are reduced, cost of production must be reduced also, or production cease until paying prices can be realized. It is an unpleasant outlook, but it has to be met one way or other. It is a matter of regret that the prospect of maintaining consumption at a limit likely to absorb the present heavy production is extremely doubtful. The alternative must be lower prices, than which we know of nothing so likely to curtail production, and at the same time reduce cost. When business becomes unprofitable, work will be suspended, but we know of no concern likely to shut down so long as it can be run at a profit. Some of the strongest are already running single turn, and it is expected that a good many who have hitherto been able to run at a living profit, will have to succumb to the law of "survival of the fittest."

Structural Iron.—There is not a great deal of new business coming in, although the outlook is fair. Beams and Channels are steady at combination prices, 4¢ and 4.2¢, but Angles, Tees and Bridge Plate are somewhat weak and irregular, say 2.9¢ to 3¢ for Angles, 3¢ to 3.3¢ for Bridge Plate, and 4¢ for Tee.

Plate and Tank Iron.—There is a moderate demand, made up chiefly in orders for small lots, but sufficient in the aggregate to maintain the status quo. Competition is very close on desirable orders, and manufacturers claim that they are already pretty well down to first cost. As a rule quotations are nominally unchanged, but concessions of a tenth or more are mentioned in connection with large lots. We quote about 3¢ for Tank and Ship Plate; 3.5¢ for Shell; 3.75¢ for Refined; 4.75¢ to 5¢ for Flange; and 5.75¢ to 6¢ for Fire-box.

Sheet Iron.—The market is quiet, and prices have somewhat of a downward tendency, although manufacturers have a great deal of work under contract. Prices are as follows for small lots:

Common Sheet, No. 27 and 28..... 5.5¢
Common Sheet, No. 26..... 4.75¢
Common Sheet, No. 25..... 4.50¢
Common Sheet, No. 24..... 4.35¢
Best Refined 1/4¢ to 1/2¢ advance on the above.
Best Bloom Sheets, No. 26 to 28..... 7¢
Best Bloom Sheets, No. 25 to 27..... 6 1/2¢
Best Bloom Sheets, No. 24 to 26..... 6 1/4¢
Common Red Plates, 3-16 to 1-8..... 3.5¢
Blue Annealed, 3-16 to 1-8..... 3.8¢
Best Bloom Galvanized, discount..... 35¢
Second quality, discount..... 45¢

Wrought Iron Pipe.—Prices are very much demoralized, although there is a large business doing. Boiler Tubes can be bought at 4 1/2¢ to 4 5/8¢ discount from list price, and Gas and Steam Pipe at 6 1/2¢ to 6 5/8¢ off.

Steel Rails.—There is more inquiry, and for small lots quite an active demand. Several orders, ranging in quantity from 500 to 2500 tons each, have been placed for early delivery, and there are a number of such orders still waiting their turn. Prices begin at \$50 for large lots, seller's option, up to \$52.50 for early delivery, and probably \$1 1/2¢ ton more for light Rails, which are in active request. We hear of a sale of 2500 tons 60¢ by an Illinois concern at \$52.50 at mill, and sales East at about same figure for 35¢. Notwithstanding the large amount of work under contract, manufacturers are evidently desirous to secure all the orders they can get from good buyers at current rates.

Steel Blooms.—Nothing doing, \$41 was bid for shipment last week, but sellers require more time for delivery than buyers are prepared to grant.

Iron Rails.—The demand is decidedly more active, and several good-sized orders have been taken. The quantity called for seldom exceeds 500 to 600 tons, but several of the mills have filled up pretty well within the past two weeks. Heavy sections can be had at \$44 at mill; light at all sorts of prices, from \$46 upward.

Railway Fastenings.—Spikes sell at prices varying from 2.6¢ to 3¢, according to the quantity and quality. Fish Plates are quiet and steady at about 2.5¢.

Old Rails.—Prices are again lower, with very little disposition to buy. A 500-ton lot Doubles was sold at \$28, Baltimore, and \$26.50 was bid for Tees, Philadelphia, a few days ago, but it is doubtful if the offer could be had to-day.

Crop Ends.—Sales of 1000 tons reported for shipment to New York at \$25, offered at same price Philadelphia, with chances of concessions being granted to a good buyer.

Scrap Iron.—Is dull, with a declining tendency. Wrought, \$27.50 to \$30.50; Cast, \$20.

Nails.—Steady and unchanged at about \$3.25, net.

PITTSBURGH.

[By Telegraph.]

PITTSBURGH, Pa., May 10, 1882.

The Western Nail Manufacturers' Association held a meeting in this city to-day. The attendance was large. The members of the association pledged themselves to sell no Nails at a less price than \$3, net rates, less 2 per cent. for cash.

Office of The Iron Age, 77 Fourth Avenue,
PITTSBURGH, Pa., May 9, 1882.

The general business situation has not varied much during the past week. While there is no special activity in manufacturing circles, there is a fair business, nevertheless—all that can be expected under existing circumstances. The most encouraging feature is the continued favorable weather for the growing crops, and the crop reports from nearly all sections are of a most encouraging character.

There has been no conclusion arrived at as yet between the mill owners and the Amalgamated Iron Association. The matter will be held in abeyance until the latter part of the month, when there will be another conference. What the result will be is a matter that is difficult to foretell, but it is probably safe to conclude that, unless there is a very decided improvement in the Iron business in the meantime, the mill owners will refuse to meet the present demands of the ironworkers. It is understood that the rollers and heaters are satisfied to renew the present scale, and that it is the puddlers who are "kicking." It appears that the former are much better paid than the latter, but the rollers and heaters are unwilling to concede

anything, and an advance of 15 % is demanded all around in consequence. It is claimed by those who are well posted in the matter that the Amalgamated Association, instead of demanding an advance from the mill owners, should go to work and revise the scale of wages, reduce the pay of the rollers and heaters and increase that of the puddlers. The next conference takes place on the 20th inst.

Pig Iron.—Business continues very dull, and no improvement is expected until after the labor question has been disposed of. The mills are buying only as immediate actual necessities require, and with some furnace anxious to sell, prices are weaker, although without quotable change. As soon as the labor issue has been settled an active market is confidently looked for, as stocks in mill yards are very much reduced, and it will require 20,000 to 25,000 tons to give each of the mills anything like a fair supply.

While, as already stated, there are some furnace anxious to realize, the great majority of those tributary to this market are comfortably situated, and are prepared to hold their Iron until wanted. Standard brands of Lake Ore Neutral Forge may now be fairly quoted at \$25.4 mos., and native Ore do. at \$24.50; small sales of Foundry at \$25.50 to \$27.50 for No. 2, and Cold-blast Charcoal, last sale reported, was at \$38, cash. Bessemer Iron is nominal at \$28, 4 mos.

Muck Bar.—There is no demand whatever, and there have been no sales reported for several weeks. The mills are able to make all they require, and they see no reason, in the present condition of affairs, to anticipate future wants. It is the desire and intention of mill men, almost without exception, to work up all kinds of stock as close as it is possible, so that, in the event of a lock-out, they will have nothing to do after closing down their mills. In the absence of sales, we quote nominally at \$38 to \$40, cash at mill, for cold-short to good neutral.

Manufactured Iron.—It is impossible, in the present condition of the market, to give accurate quotations. Those of our mills that are sold up are refusing to accept orders under the card, while others, with their orders filled and anxious for business, are making sales at from one to two tenths under the card. In all contracts for future delivery manufacturers have been careful to make provision that the contracts aforesaid, in the event of a lock-out, shall be void. Merchant bars are still quoted at \$2.50 rates, although we hear of sales as low as \$2.25. Sheet, \$4.30 for No. 24, and Tank is \$3.30. There has been considerable activity in Skelp Iron, with rumors of some large sales. We hear of one lot of 2000 tons to go to Chicago, at 2 1/2¢, and we hear of an offer of 2 1/2¢ net cash having been refused for a lot of 1000 tons. Hoop Iron continues very dull, but Sheet mills are reported as being very well supplied with orders.

Nails.—There is very good local trade, and orders from the West are commencing to come forward more freely; the prospect is regarded as being very promising for a good healthy summer trade. Sales, for nearly all deliveries, are being made at \$3.10, 60 days, with the usual discount of 2 per cent. for cash. At the regular monthly meeting of the Western Nail Association, which takes place to-morrow, it is probable some action will be taken with a view to reducing production in the event of it being necessary. The factories of Chess, Cook & Co., Schoenberger & Co. and Zug & Co. are in operation. Graff, Bennett & Co. and Jones & Laughlin are giving the Nail trade but little attention at present.

Wrought Iron Pipe.—Business is reported as improving as the season advances, and the prospect is regarded as being favorable for a good summer trade, although though there are the expectations of the more sanguine have not been realized. Prices continue easy. While 65 % is generally quoted as the regular discount on Gas and Steam Pipe, it is claimed that sales are being made at 67 1/2 % off the card. On Boiler Tubes discounts are quoted at from 45 to 50 %. Oil-well Casing is quoted at 60¢ to 62¢ per foot, net, ditto Tubing, at 18¢ to 20¢.

Rails, &c.—Steel Rails are quoted, nominally, at \$53 to \$55, cash, delivered at mill for summer delivery; no sales reported here for same. Track supplies continue dull, but prices remain unchanged. Splice Bars, 2.50¢ to 2.60¢; Track Bolts, 3.65¢ to 3.75¢ with square, and 3.90¢ to 4¢ with hexagon, nuts.

Scrap.—Wrought Scrap is quoted at \$28 to \$30 per net ton; Wrought Turnings, \$22 to \$23; Car Axles and Car Springs, \$35 to \$40; Old Car Wheels, \$27 to \$29, gross, the outside figure for straight. Dealers all report business as being very dull.

Window Glass.—Trade continues backward, caused in part by the backwardness of the season, but manufacturers are hopeful of a good business once the summer trade opens up.

Coke.—The consumption has fallen off somewhat, caused by the blowing out of several Fig Iron furnaces using Coke, and with a large production and the supply in first hands increasing somewhat, the market is weaker and prices lower. Sales have been made to furnaces as low as \$1.65 per ton on cars at ovens. We quote at \$1.65 to \$1.75; small foundry orders, \$1.85 to \$1.90.

CHICAGO.

Office of The Iron Age,
36 and 38 Clark Street, cor. Lake Street,
CHICAGO, May 8, 1882.

Hardware.—We have no change to note worthy of mention in the market for General Hardware since our last report; a fair trade is reported as being done, and prices are firm.

Nails.—The demand for Nails, while not as large as may have been looked for, on account of the activity in building, has, on the whole, been very satisfactory, and quotations as a rule are firmly adhered to. We quote, 10d. to 6d., \$3.40 to \$3.50 per keg, according to quality.

Pig Iron.—We have no change to report in this market. The hand-to-mouth character of orders still continues to be the rule. We quote: Lake Superior Charcoal, Nos. 1 and 2, \$29; No. 3, \$31., and Nos. 4, 5 and 6, \$33 to \$34;

Calumet, \$27.50 to \$28; Silvery Soft, \$24 to \$26; Crane, No. 1, \$28.50; No. 2, \$27.50; Thomas, \$28.50 to \$29.50; Imported Scotch, \$29 to \$30, and American Scotch, \$26 to \$28.

Manufactured Iron.—The demand for Manufactured Iron, while perhaps not as large as in previous weeks, has been very good. We note a decline in Bars from \$2.80 to \$2.70, and quote Angle, 4¢; T, 4 1/4¢; Beams and Channels, 4 1/4¢ to 4 1/2¢; Hoop at 3.80¢ rates. Sheet, Plate and Tank, 10 to 14 gauge, 3.80¢; 15 to 17 ditto, 4.10¢; 18 to 21 ditto, 4.40¢; 22 to 24 ditto, 4.60¢; 25 to 26 ditto, 4.80¢, and 27 ditto, 5¢. Patent Cold-rolled Shifting, dis. 20¢; Norway Iron, Original Bars, 5¢ rates; Norway Iron, re-rolled, 6¢ rates; Ulster Iron, 4 1/2¢ rates; Low Moor Iron, 5¢ rates; Nuts and Washers, 7 1/2¢ off list; Wrought Boat Spikes, 3 1/4¢ rates.

Steel.—Trade in Tool and Machinery Steel during the week has been fairly active, while Agricultural Steel is in light request. We quote: Tool, 12¢; Machinery, O. H., 5 1/2¢; Crucible Machinery, 7¢; Hammer, 2 inches and under, 8¢; over 2 inches, 9¢; Cast Spring, 7¢, and O. H. Spring, Tire and Sleigh Shoe, 5¢. Sheet, first, second and third quality, 12¢, 10 1/2¢ and 8 1/2¢, respectively; Crucible Plow, 6 1/4¢; Eagle Plow, 5 1/2¢; Iron Center Plow, 10 1/4¢, and soft Steel Center Plow, 10 1/4¢.

Scrap Iron.—Quotation weak and demand dull. We quote (dealers' purchasing prices): No. 1 Wrought Scrap, \$23, net ton; No. 1 Railroad Scrap, \$24 to \$25; ditto Heavy Cast, \$18; ditto Stove Plate, \$12; ditto Cast-Iron Borings, \$9 to \$10, and ditto Machine Shop Turnings, \$12 to \$13.

CHATTANOOGA.

Office of The Iron Age, Market and 8th Sts.,
CHATTANOOGA, May 8, 1882.

Business has been rather light during the week, though there is not enough letting down in prices to justify a reduction in quotations. Our figures will show about the average rates. The weather has been very warm during the entire week, and no rain, which is needed. So far there are no signs of serious labor complications in this district. The feeders at the South Traders' Rail Works, this city, struck because they were put on an equality as to time of payment with other hands. No other indications of trouble have developed.

Pig Iron.—There is nothing of interest in the crude metal market. Sales about equal the output. All grades are in fair supply, and a good deal of business, mostly in small orders, is doing. We quote: No. 1 Foundry, \$24 to \$25; No. 2 Foundry, \$22 to \$23; Gray Forge, \$20 to \$21; White and Mottled, \$19 to \$20; Car-wheel Metal, \$33 to \$37.

Ores.—We have nothing of interest to report of the Ore market. We quote: 50¢ Brown Hematite, 1/2 ton, \$2 to \$2.75; Red Fossil, \$2 to \$2.25, delivered at furnace.

Miscellaneous Articles.—Old Rails are steady at \$29; Wrought Scrap, \$20 to \$23; Cast Scrap, \$13 to \$15; Old Wheels, \$23 to \$29.

Nails.—Nails are steady at \$3.30 rates with a good outlook for the future.

Manufactured Iron.—Bar is reasonably strong at \$2.50 for large bills. The mills have all they can do for some weeks. Railroad Spikes, \$3.40; Track Bolts, \$4; Fish Plate, \$3.

Coal.—Fancy Lump, \$3; Common, \$2; Run of Mine, \$1.75 at mills.

Coke.—Furnace Coke, \$3 at point of consumption; Foundry, 10¢ to 12¢ per bushel.

Steel and Iron Rails.—Steel Bars are selling at \$55 to \$56, late summer delivery. Iron, nominal, \$48, Heavy Sections; Small T, \$50 to \$52.

CINCINNATI.

MAY 8, 1882.—**Pig Iron.**—The tone of the market in the past week is unchanged, sales continue to be confined to filling small orders for immediate uses. There seems to be no disposition on the part of makers and owners to press Iron to consumers; all are willing to wait and see what is to come. The 625,000 tons of Pig Iron that will be put out this year from the Hanging Rock and Hocking Valley regions in Ohio, and from furnaces in Kentucky, Tennessee, Alabama, Georgia and Missouri, it is thought, will all be taken to cover the actual wants of consumers, and at about present quotations of prices. Best brands Hanging Rock Charcoal, \$28.50 to \$29.50; good, No. 1, 50¢ less; Southern brands, \$26 to \$27.50; best Hanging Rock Coke, \$26 to \$27; good, 50¢ less; No. 2, \$24.50 to \$26; Southern brands, \$1.50 to \$2 less; American Scotch, \$24.50 to \$25; Silver Gray Softeners, \$22 to \$25; Hanging Rock Charcoal Cold-blast, held, \$38 to \$39; Warm-blast, \$30 to \$35. Forge Irons are quotable at from \$21.50, for low Stonewall, to \$23 for Coke; Charcoal, \$25 to \$26, and a quiet market. Scrap.—Old Rails, \$28; No. 1 Wrought, \$1.35 to \$1.40; Country, \$1 to \$1.30; Cast, 80¢ to 90¢ for No. 1 heavy; light and medium, 50¢ to 75¢; Old Wheels largely in excess of demand; offer of 1 1/4¢ would buy.

LOUISVILLE.

MESSRS. GEO. H. HULL & Co., Commission Merchants, report to us as follows, under date of May 6, 1882: There is considerably more inquiry for Iron, and several large sales for future delivery have been made on private terms. Prices, however, are somewhat lower than one week ago. We quote for cash as below:

FOUNDRY IRON.
No. 1 Hanging Rock, Charcoal..... 27.00 @ 28.00
No. 1 Southern, Charcoal..... 25.00 @ 26.00
No. 1 Hanging Rock, Stonewall..... 25.00 @ 26.00
Coke..... 15.00 @ 16.00
No. 1 Southern, Stonewall..... 24.00 @ 25.00
No. 2 " "..... 23.00 @ 24.00
American Scotch..... 23.00 @ 24.00
Open Silver Gray..... 22.00 @ 23.00
Close Silver Gray..... 21.00 @ 22.00
MILL IRON.
No. 1 Charcoal..... 22.00 @ 23.00
No. 1 Stonewall and Coke..... 21.00 @ 22.00
No. 2 Stonewall and Coke..... 20.00 @ 21.00
No. 1, Stonewall and Coke..... 19.00 @ 20.00
White and Mottled, Old and New..... 18.00 @ 19.00
Neutral..... 17.00 @ 18.00

CAR WHEEL IRONS.	
Hanging Rock, Cold-blast.....	34.00 @ 35.00
Hanging Rock, W. B.....	29.00 @ 30.00
Alabama and Georgia, Warm and Cold-blast.....	30.00 @ 33.00
Central Kentucky, Cold-blast.....	30.00 @ 33.00

W. B. BELKNAP & Co., Iron and Steel Merchants, Nos. 113 and 115 Main street, report to us as follows, under date of May 6: Mills report more inquiry for future delivery as the time approaches of possible stoppage, but there are few large sales made for immediate execution. Card is cut about 1-10th on wholesale lots here. Stocks are unquestionably light in hands of jobbers and a few days of active demand would break assortments badly. Sheet iron, especially in the lighter gauges, is toning up somewhat, and no lots are on the market at as low prices as were obtainable three weeks since. Hoop iron is the worst depressed item on the card. A year ago it sold as low as 7-10ths off the list, from which it advanced till in January, 1882, the hoop mills declared the price 1-10th off, a total advance of \$12 per ton. From this it has receded \$4 per ton, but the decline in the whisky trade has affected the cooperage interests so seriously that contracts made early in the season were but half taken out, and it is impossible to place the iron. The railroads are exercising the severest economy, and will continue to do so till the crops are assured. Commercial travelers report extreme dullness in hardware.

BALTIMORE.

W. N. WYTHE, Iron and Steel Merchant, 46 and 48 South Charles street, reports us the following, under date of May 8, 1882: A much improved trade has been doing for the past week, inquiries and orders coming both larger and more frequent, accompanied by a better and more hopeful feeling on all sides.

Ref. Bar Iron, 1 to 6 1/2 to 1 1/2	27-10 @ 29-10
" 1 to 4 1/2 to 1 1/2	27-10 @ 29-10
" 1/2 to 1, Round	27-10 @ 29-10
" and Square	27-10 @ 29-10
Hoop Iron, 1 1/2 wide and upward	34 @ 34 1/2
Band Iron, from 1 1/2 to 4 in. wide	34 @ 34 1/2
Horse shoe Iron, 1 1/2 to 4 in. wide	34 @ 34 1/2
Norway Nail Rods.....	5 1/2 @ 6
Black Diamond Cast Steel.....	13 1/2 @ 14 1/2
Machinery Steel.....	9 @ 9 1/2
Cast Spring Steel.....	9 @ 9 1/2
Common Horse Nails.....	10 @ 14 1/2
Railroad spikes, 3 1/2 x 9-16.....	34 @ 34 1/2
Perkins' Horse shoes 1/2 keg of 100 lbs.....	34-87 1/2
Mule shoes.....	5-87 1/2

B. C. HOFFMAN & Co., Iron and Commission Merchants, report the Pig Iron market as follows, under date of May 8, 1882: The iron market continues quiet—purchasers confined to immediate wants only—but sufficient to absorb the production of best brands Wheels and Foundry Irons, which keep well sold up. We quote prices about as follows:

Baltimore Charcoal Wheel Iron.....	35.00 @ 36.00
Virginia C. B. Wheel Iron.....	35.00 @ 36.00
Anthracite No. 1.....	23.00 @ 24.00
" No. 2.....	21.00 @ 22.00
" No. 3.....	19.00 @ 20.00
Charcoal C. B. Blooms.....	20.00 @ 21.00
Refined Blooms.....	20.00 @ 21.00

ST. LOUIS.

MESSRS. HOFFER, PLUMB & Co., Pig Iron and Iron Ore Merchants, 417 Pine street, write us, under date of May 6, 1882: There is no change to note here either in the tone of the market or in prices. We quote:

HOT BLAST CHARCOAL.	
Missouri.....	25.00 @ 26.00
Ohio.....	25.00 @ 26.00
Southern.....	25.00 @ 26.00

COAL AND COKE.	
Missouri.....	None offering.
Southern.....	25.00 @ 26.00
Ohio.....	25.00 @ 26.00

MILL IRONS.	
Red-short.....	25.00 @ 26.00
Neutral.....	24.00 @ 25.00

CAR WHEEL AND MALLEABLE IRONS.	
Missouri.....	27.00 @ 28.00
Southern.....	27.00 @ 28.00
Ohio.....	26.00 @ 27.00

RICHMOND.

MR. ASA SNYDER, Iron Merchant and Furnace Agent, writes as follows, under date of May 8, 1882: The market is quiet, but very fair demand exists for small lots. Quotations as follows:

No. 1 Scotch Pig Iron.....	24.50 @ 25.00
No. 1 Anthracite Pig Iron.....	26.00 @ 26.50
No. 2.....	24.00 @ 24.50
No. 3.....	23.00 @ 23.50
No. 1 Virginia Coke Pig Iron.....	24.00 @ 24.50
No. 2.....	23.00 @ 23.50
No. 3.....	22.00 @ 22.50
Virginia Charcoal C. B. Wheel Iron.....	33.50 @ 34.00
Old Rails.....	27.50 @ 28.50
Wrought Scrap.....	24.50 @ 25.50
Cast Machinery Scrap.....	24.00 @ 25.00
Refined Bar Iron.....	27
Horse Shoes (Treaders).....	4.00
Mule.....	5.00

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

LONDON, ENG., April 24, 1882.

THE IRON MARKET

has not been remarkably lively during the week, in fact, there is much flabbiness on all the open changes. Much of this is doubtless owing to the expectation that certain kinds of finished iron will shortly be reduced in price. So long as there is uncertainty on this point, users and merchants will hold back their specifications, and will buy no more than they absolutely need for the satisfaction of the wants of the time being. Whether consumers expect to see crude iron lower or not, depends is unable to state. Certain it is that almost all kinds of pig iron have grown weaker during the past seven or eight days. At Glasgow warrants have declined in value to the extent of a shilling or so per ton, under the influence of heavy sales and an enormous speculative account. The change of furnaces from hematites to ordinary pig has assisted this weakness, notwithstanding the expectation that that contingency was provided for in the restrictive arrangement. The Scotch ironmasters will meet to-morrow to settle this point, which is of some importance, seeing that the addi-

tional production thus caused is sufficient to upset all the beneficial effects of the reduced make. At Middlesboro' prices have also declined, in spite of a fairly respectable statistical position. There is a sharp fight going on between the bears and the smelters, the former being alleged to be extremely short of iron to fulfill their engagements, while the ironmasters are resolved to uphold prices for the moment in order to crush their opponents. The issue of the struggle will be interesting, except for some of the bears, who are pretty certain to suffer in the process. On the West Coast the drop in pigs has been brought about in a more natural manner, but it now amounts to a very serious reduction from the late average, and must have a tendency to lessen the output. In other parts of the country crude iron is weak at the rates I gave you last week, and with the position decidedly in favor of buyers. Heavy manufactured iron is unchanged, simply because the plate mills, &c., are well supplied with orders for forward deliveries. Ordinary finished iron is dull and unquestionably weak, although producers are doing their best to bolster up quotations. Ruling figures are as given in my last, but there is not the slightest difficulty in shading marked bars down to about £7, 12/6. The sheet-iron makers, by the bye, have confirmed the arrangement to restrict the output. It is clear that this state of affairs will not long endure. Some, at least, of the manufacturers will break away from the "list" and reduce their quotations in such a way and to such an extent as to assimilate nominal and real prices. In Beamer blooms there is no real business on American account, although makers would be pleased to accept very low figures. In the same way new business in steel rails on your account is scarce, although there are still shipments in fulfillment of old contracts. Ordinary sections are valued at about £5, 12/6 @ £5, 15/ per ton. Old rails are without feature at about £3, 17/6 for T's and £4, 7/6 for D. H.; heavy wrought scrap at about £4 and old railway leaf-spring steel (according to John H. Austin & Co.) £5 or thereabouts per ton. Iron rails are called £5, 5/ @ £5, 10/ for 30 pound and upward sections, but are in slight request for your market. Freight would seem to be largely nominal, but I have 10/ quoted for pig by ordinary steamer Glasgow to New York; Welsh ports to New York, Philadelphia or Baltimore, 14/ @ 15/ and Barrow to same, 15/ @ 16/ per ton. Tyne and Tees rates range from 15/ @ 17/6, and Liverpool to Northern ports 11/ @ 15/ for iron. Tin plates have not yet assumed the strength expected as an outcome of the movement for restricting the production. Cokes are still to be had at 15/ @ 15/6, prices which are partly the result of severe bearing at Liverpool, and partly by reason of the sudden drop in tin. As that metal is now moving up again, tin plates may possibly grow gradually stronger.

SCOTCH PIG IRON

is depressed and dull. The bears have most narrowly escaped being fully cornered, but have been aided by a fortuitous combination of events, and having escaped from a very dangerous position, have been enabled to carry the war into the enemy's country. Holders of warrants who had long been retaining their securities in the hope of an advance, have at last thrown enormous quantities of iron on the market for realization. Another furnace has been lighted at Coltness, and two at Govan have recommenced making common pig, so that something like 600 tons a week have been added to the make. Unless the ironmasters check this change by stopping other furnaces, prices will fall yet lower, especially as shipments are again unfavorable. In Connal's stores there are 630,381 tons (an increase of 1773 tons this week), as against 547,935 tons a year ago. There are 108 furnaces blowing, against 121 a year since. Imports from Middlesboro' into Scotland are smaller. Writing from Glasgow on April 22, James Watson & Co. said: "Since the date of our last report, the Scotch pig iron market has been depressed, with a considerable quantity of warrants changing hands. On Monday the market was quiet from 47/ to 47 1/4, prices receding on Tuesday from 47/ to 47 1/4. On Wednesday sales took place from 47/ to 47 1/4, and back to 47 1/4. Yesterday the tone was very flat, from 47/ to 46/9, cash, closing at 46/11. To-day prices have improved, owing to favorable exports for the week, business being done from 46/11 to 47/3 1/4, cash, closing sellers 47/3, buyers 47/2. A moderate business is doing in shipping brands, which, as will be seen below, are considerably lower nearly all round. The shipments last week were 11,604 tons, as compared with 13,736 tons for the corresponding week of last year." We quote:

	No. 1.	No. 3.
G. M. B., at Glasgow.....	47/9	46/
Clyde.....	47/6	46/6
Coltness.....	47/6	46/6
Langloan.....	47/6	46/6
Gartsherrie.....	47/6	46/6
Summerlee.....	47/6	46/6
Caldar.....	47/6	46/6
Carnbroe.....	47/6	46/6
Bengarnock, at Ardrossan.....	47/6	46/6
Edinboro.....	47/6	46/6
Dumfries.....	47/6	46/6
Shotts, at Leith.....	47/6	46/6
Kinnell, at Bo'ness.....	47/6	46/6
Carroll, at Grangemouth.....	47/6	46/6

CLEVELAND IRON

is quiet, notwithstanding a steady decrease in stocks and a known scarcity of favorite shipping brands. Makers quote 43/6, prompt, and 42/9 May-June deliveries, but some of the merchants sell at 42/9 @ 43/6, prompt, and 41/9 @ 42/9, short futures. Shipments average about 3000 tons of pig iron daily from Middlesboro', but there is an impression that this rate will shortly fall off, as the French buyers are believed to have been securing stock prior to the coming into force of the new tariff. For G. M. B., net cash, f. o. b. at makers' wharves in Tees, prices are, less 2 1/2%:

No. 1 Foundry.....	47/6	Mottled.....	43/
" 2 ".....	45/6	White.....	41/6
" 3 ".....	43/6	Refined Metal.....	42/6
" 4 ".....	41/6	Kentledge.....	43/6
" 4 Forge.....	42/6		

The works are busy, particularly the rolling and rail mills. Last week Bolckow-Vaughan's sent off 1400 tons blooms to Philadelphia from West Hartlepool. Those were part of an old contract.

WEST COAST HEMATITES

have not improved since I last wrote—in fact transactions are reported to have taken place at 54/3—a lower level than any yet recorded. Nominal rates for mixed lots of Nos. 1, 2 and 3 are 54/6 @ 55/, hence we may not unreasonably assume that buyers are thoroughly masters of the position. The dullness of the steel rail outlook is against the smelters, who are fairly engaged at present, but have a very blank outlook beyond May-June. Prices are:

	No. 1.	No. 2.	No. 3.
Cleator.....	54/	53/6	53/
Lonsdale.....	57/	56/	55/
Workington.....	57/	56/	55/
West Cumberland.....	57/	56/	55/
Lowther.....	57/	56/	55/
Moss Bay.....	57/	56/	55/
Distington.....	57/	56/	55/
Harrington.....	57/	56/	55/
Folway.....	57/	56/	55/
Maryport.....	57/	56/	55/

Last week's shipments reached 13,379 tons pig iron and 5566 tons of rails and blooms. Ores are 13/ @ 15/ at the mines, and Spanish of 52 @ 54 per cent. 17/6 ex ship.

ELECTRIC LIGHTING

is making slow but sure progress in this country, in spite of the incessant and solid opposition of those who are interested in gas and gas works. The exhibition at the Crystal Palace, London, has proved a great success. The daily attendances are very large, and in the theatrical parlance, it is altogether "a big go." I visited the Electrical Exhibition in Paris last autumn, and was prepared to find the Crystal Palace show behind that excellent display, but I have been rather agreeably disappointed. The *toute ensemble* here is, perhaps, not quite so striking to the eye, owing to the Crystal Palace being so much larger than the Palais de l'Industrie, but several of the subsidiary courts, &c., are, in my opinion, far ahead of the Paris display. In the limited space at my command I cannot attempt anything like a full account of the exhibits. I may, however, be permitted to give a very terse summary, based upon impressions resulting from several visits to the Palace, near which I happen to reside. As for the gas lights, I think there can be no question that the Anglo-American Company lead with the Brush lamps, which burn very steadily, run evenly and have the merit of being cheaper than gas—according to certain statements recently made by the city authorities. The big (150,000 candle-power) light of this company is a great feature. It has 2-inch carbons and gives a light of dazzling intensity, but it roars, hisses and blazes up nearly a foot high, hence I look upon it as being a mere curiosity rather than a useful creation. With such lights no building would be safe from fire risks, therefore it would be infinitely preferable to have a number of the smaller or lights rather than one large open one of this size and power. The same company are running the Lane-Fox incandescent lights, and make a splendid display in the gorgeous Alhambra courts. The lamps there are fed from accumulators, and are enclosed in egg-shaped opaque glass globes, mounted on crystal chandeliers (electrolabra, or electrolights, as I believe, the correct term nowadays). The best show in the whole affair, however, is that of Edison, who has fitted up what is known as the Entertainment Court in a most sumptuous manner, incandescent lamps being exclusively used, of course. There is one chandelier in this court which I take to be the finest example of hammered brasswork produced in this century. The makers are B. Verity & Sons, of London, who have a good reputation for high-class gasfittings. The chandelier bears about 100 lamps, which are placed in the mouths, so to speak, of lilies or harebells, and contrast splendidly with the polished brasswork. Sunflowers and other work also entwined about their stems, creating a perfect forest of brasswork, yet without being displeasing to the eye. Electrically the chandelier is divided into three separate circuits, so that one set or the whole three sets may be used at will. Besides this, a billiard table is fitted in a suitable manner, and there are wall brackets, sconces, grilles, &c., in brass or crystal, to set off the lamps and show the possibilities of the new illuminant. The court is a very large one, and is filled with Edison's inventions, including the phonograph, microphone, &c. It is, in fact, a summary at once of Edison and of modern progress. In thus praising Edison I do not wish to disparage Swan, Maxim and others, whose displays are most interesting. I simply state that Edison is ahead. Swan's chandelier is very fine, and his court is well lighted, besides which, I believe, his lamps have only about half the resistance of Edison's. Maxim's lights are mostly on crystal, and show to advantage. Edison is literally "all over the shop," the incidental lamps about the building, in the concert hall, &c., being supplied by him. Weston's arc lamps are good, as also are Cromptons, but I miss the Lamps Soleil, shown in Paris, and one or two others. In the City, Siemens lights have been discontinued, but Brush still holds its ground, and Edison has just completed an installation of (I believe) a total of 2000 lights on the Holborn Viaduct. Some of these are in the shops, hotels, &c., others in the street lamps. In the latter case two lamps occupy the place of one old gas jet, and give more than double results. On the whole the thing works admirably well, and will, I fancy, be such a success as to lead to a considerable extension of the project.

GUNS FOR THE UNITED STATES.

The Birmingham correspondent of the *Ironmonger* mentions that a considerable business is being done in shot-guns in that town on behalf of buyers in the States. He says, *inter alia*: "The direct trade between manufacturers and American gun dealers is steadily growing, and the Americans are rather fastidious about quality, and seldom hesitate to pay the higher price demanded for a better article. Their chief anxiety appears to be to secure the exclusive supply of suitable patterns, and where approved manufacturers are willing to bind themselves to supply the American market through one exclusive channel, they have no difficulty in obtaining three years' contracts for their entire make. Even without such compacts several of the leading houses report themselves well under order for the American market until the close of the year, though in most cases a small margin of productive power is reserved for special orders for high-

grade guns. As from 100 to 300 guns are turned out weekly at the larger gun-making establishments, it will be obvious that the American orders alone represent an enormous trade, though it has not hitherto, I believe, been a very profitable one. * * * Thomas Bland & Sons, W. W. Greener and Mr. Bonehill are busy on American account, and have orders sufficient to last the whole of this year." The last named has orders for 1000 guns ranging in price, wholesale, from 9 guineas up to £50 each.

THE DROP IN TIN.

to which I briefly referred last week, has attracted much attention, not only for that reason, *per se*, but because several failures have been announced among the gentlemen whose operations turned out other than advantageous to themselves. These stoppages are understood to have been "arranged" in a discreet and private manner, hence it is highly improbable that details will be available in the ordinary Bankruptcy Court channels. It is, perhaps, as well for the noble brotherhood of metal speculators that this should be so, otherwise the public might be hugely edified and confidence in the existing state of things rudely shaken. A gentleman said to me the other day, "I have just come off 'Change, and, upon my word, the way in which 'the ring' gambles in metals is worse than betting on horse racing. They sit round and make books, as it were, exactly like bookmakers at a race meeting; but the worst of it is that what the gamblers arrive at is something which affects me, a user of metals, when I want to purchase copper or tin." I expressed a decent amount of sympathy with the speaker, but told him I could not heartily enter into his view of the matter, chiefly because I thought it feeble to croak over what was clearly a legitimate outcome of ordinary commercial competition. If speculators like to buy up copper, tin, &c., there is no law against that course of action, and it depends upon themselves whether they can hold and sell at their own figures, or whether the actual consumers can hold back and so induce lower rates than the limits originally fixed by the speculators. If consumers desire to kill all speculation, they must be prepared to buy foreign metals as they are offered, irrespective of their own requirements. Even then some of their own number would certainly "dabble," and so all the evil would occur over again.

The present drop in tin is certainly a forcible illustration of the changes a few weeks may bring forth. Late in January English ingots were £117, and fine foreign £114, whereas early last week English ingots were called about £95, and foreign at one time fell to £87. Since then bearing has been recommended, with an encouraging measure of success, the closing prices on April 21 being £98 for ingots and £94 @ £94. 10/ for fine foreign. Stocks here are growing rather heavier, but the quantity of Straits stock is small. On April 1 we had a total visible supply of 14,095 tons, against 13,546 tons on February 28, 1882. On March 31, 1881, when the stock was 14,780 tons, foreign was £88. 10/ and English ingots £92. 10/ @ £93.

PROPOSED STANDARD WIRE GAUGE.

This is a matter which is violently agitating the wire and metal manufacturers of Great Britain. There has long been an immense amount of just dissatisfaction with the want of uniformity among the various gauges now in use, and, as well as annoyance, is constantly incurred owing to these undesirable irregularities. In Great Britain we have literally scores of gauges—the Birmingham, the Yorkshire, the Warrington, Stubbs' Scotch, &c. In the States you have Brown & Sharpe's, besides some of British make. In Canada Stubbs' is generally used. The French and Italians swear by the decimal system based upon the meter, while in Germany there are several gauges, including the metrical system. The Associated Chambers of Commerce recently passed a resolution advising the adopting of a certain gauge prepared by a Mr. Harding, of Leeds, but the wire manufacturers now declare the scheme put forward to be entirely impracticable, and are organizing an active opposition. The Board of Trade (Standards Department) is dealing with the question, and in order to test the matter thoroughly has issued circulars to about 160 manufacturers, inviting expressions of opinion on the subject. The proposed standard gauge is as under:

SUGGESTED SCALE OF SIZES OF STANDARD WIRE GAUGE.

Denom. in standard.	Equiv. in imp. meas.	Denom. in standard.	Equiv. in imp. meas.
No. 6/0	Inch.	No. 10	Inch.
6/0	.020	10	.0125
7/0	.0177	11	.0112
8/0	.0158	12	.0100
9/0	.0142	13	.0089
10/0	.0127	14	.0080
11/0	.0113	15	.0072
12/0	.0100	16	.0065
13/0	.0089	17	.0059
14/0	.0080	18	.0053
15/0	.0072	19	.0048
16/0	.0065	20	.0043
17/0	.0059	21	.0039
18/0	.0053	22	.0035
19/0	.0048	23	.0031
20/0	.0043	24	.0028
21/0	.0039	25	.0025
22/0	.0035	26	.0022
23/0	.0031	27	.0020
24/0	.0028	28	.0018
25/0	.0025	29	.0016
26/0	.0022	30	.0014
27/0	.0020	31	.0013
28/0	.0018	32	.0012
29/0	.0016	33	.0011
30/0	.0014	34	.0010
31/0	.0013	35	.0009
32/0	.0012	36	.0008
33/0	.0011	37	.0007
34/0	.0010	38	.0006
35/0	.0009	39	.0005
36/0	.0008	40	.0004
37/0	.0007	41	.0004
38/0	.0006	42	.0003
39/0	.0005	43	.0003
40/0	.0004	44	.0002
41/0	.0004	45	.0002
42/0	.0003	46	.0002
43/0	.0003	47	.0001
44/0	.0002	48	.0001
45/0	.0002	49	.0001
46/0	.0001	50	.0001

The Warrington makers, who produce 70 or 80 per cent. of all the heavier gauges of wire made in this country, are strongly opposed to this gauge. They point out that five sizes of fine wire are expressed in 10,000ths of an inch, and six sizes in 100,000ths of an inch, which they very properly say is absurd, seeing that wire cannot possibly be drawn to 10,000ths of an inch, much less to 100,000ths. Besides this, they object to the "unnecessary" departures from existing gauges, their proposal being the adoption of a scale of gauges which would virtually adopt the B. W. G. for heavy wire and rolled metals, and the Yorkshire gauge for fine wire, such as is used for hackle pins,

dandy rolls and for textile purposes. It yet remains to be seen what the Board of Trade authorities will do. I am told that they are inclined to favor the adoption of the decimal system, based upon the English inch, in which they would have a large following, including the Sheffield and other iron and steel manufacturers.

FOREIGN.

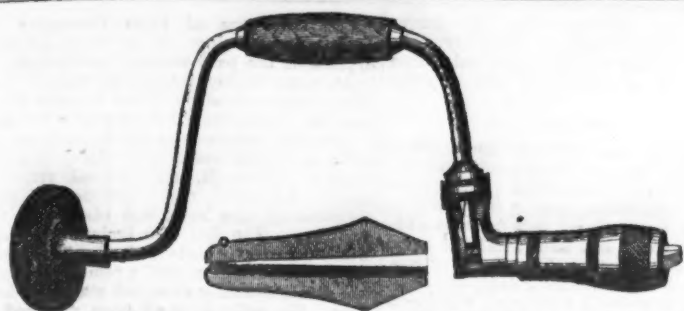
FRANCE.

Monteur des Interests Matériels.
PARIS, April 23, 1882.—Metals.—The weather has been a little less favorable to crops, but no positive damage is reported. Metals have been dull and dropping fast, the decline has been general, and we now quote Copper, Chili Bars, 165 @ 170 francs per 100 kg.; Ingots and Slabs, 175; Best Selected, 177.50, and pure Corocoro Ore, 169.50; Tin, Banca, 252.50; Bismuth, 250; Strains and Australian, 247.50, and English, 250; Lead, 35 @ 36.75, and Spelter, 45.25 @ 45.75. Iron.—The market at Paris has steadied; we quote Merchant 21 francs, Flooring Iron, 22. Dealers here have made no contracts with rolling mills for Merchant deliverable beyond August; next, and they have now endeavored to engage deliveries beyond that date below the basis of 20 francs for Merchant and 21 francs for Flooring, but in this they have so far been foiled, makers not varying from those figures delivered at Paris after August; next. Makers have taken a firm stand, based on the present price of Pig Iron and Coke, and the less cheerful aspect abroad. Old Rails remain firm at 125 francs, being less freely offered. In January there paid city dues in this city 3471 tons of Structural Iron and 3571 tons Pig. Last year in the same month the amount was only 2500 tons and 1955 tons respectively. This shows that as early as January extensive preparations were making for the building season this year, and more so than last year at the corresponding time. The project of the Northern force to build a rolling mill within the precincts of our city has been postponed for the present, in consequence of certain steps taken by the Rhine and Sambre Rolling Mills. In the meantime the iron demand is moderately active at 19.25 for Coke Merchant. The Haute-Marne is active and firm, Coke Merchant commanding 21 @ 21.50. The Meurthe and Moselle region remains steady, with a good deal doing for future delivery. In the department of the North the blast furnaces are so overwhelmed with work that the weakness in the Belgian iron market has failed to impress prices in the least. Coal.—The return to coal weather has not lasted longer than it has in the past. Coal much in this market; in the rest of France it is tolerably active with stocks by no means large.

BELGIUM.

(Revue Universelle.)

BRUXELLES, April 23, 1882.—Iron.—There are indications of an improved feeling growing up in iron matters in Belgium, looking like a healthy reaction from the depression we have suffered from since the latter part of January. The demand has so far, however, not increased much. Consumers still resist every enhancement of prices. We quote toward the close: Merchant No. 1, 14 francs, with 1 franc difference between numbers; Beams, 15; Corners, 15; Sheets No. 10, 10.50; No. 2, 11.50; No. 4, 12.50; No. 6, 13.50; ditto Hoops, 23.50, and ditto Axes, 24.50. The adjudication of cars will stimulate activity a little. Every body seems to make a bet that the present position of the market at least for a couple of months longer; we are evidently in



BIT BRACES FOR 1882.

After having made almost every kind of a Bit Brace and tried them on the market, we find that our BARBER IMPROVED BEACE, as seen in this Cut, is the only one which gives universal satisfaction. During the past six months we have made some slight changes on this Brace, which remove all objections to it and make it absolutely perfect. We are aware that other Braces are sold at a less price, but they are also made at a less cost. Everything which goes into the Barber Brace is of the best and most expensive quality, and one of them will outlast six of any other kind. The Sweeps and Jaws are of steel, the Head of lignumvita and Revolving Handle of rosewood. It is highly polished and heavily nickel plated. The Jaws will hold, without any fitting, Tool Shanks of every shape, including Round Twist Drills. When furnished with the Ratchet Attachment, for boring in places where the Sweep cannot be revolved, it is the only Brace which will answer that purpose. We have not changed the price for many years, and do not anticipate any change in the near future; but from year to year we have been adding to the quality so as to make the cost to us double what it was ten years ago. We have recently added to our manufacturing facilities, and are now prepared to supply the world with Braces.

LIST PRICES.

No. 10—14-inch Sweep, per dozen...\$33.00	No. 14—6-inch Sweep, per dozen...\$21.00
No. 11—12-inch Sweep, per dozen... 30.00	No. 31—12-inch Sweep, per dozen... 39.00
No. 12—10-inch Sweep, per dozen... 27.00	No. 32—10-inch Sweep, per dozen... 36.00
No. 13—8-inch Sweep, per dozen... 24.00	No. 33—8-inch Sweep, per dozen... 33.00

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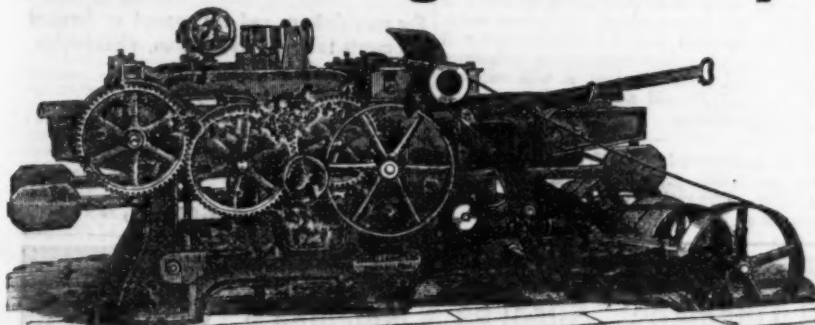
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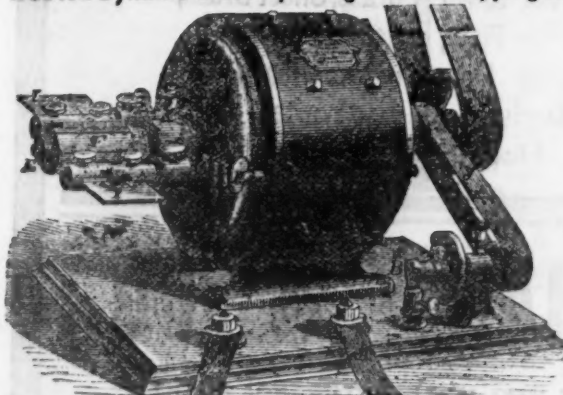
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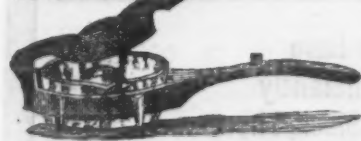
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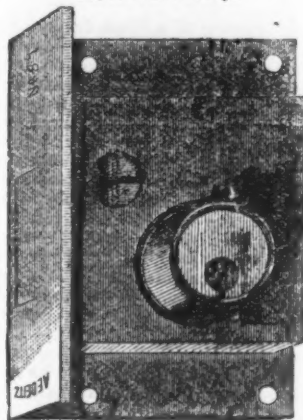
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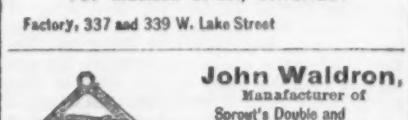
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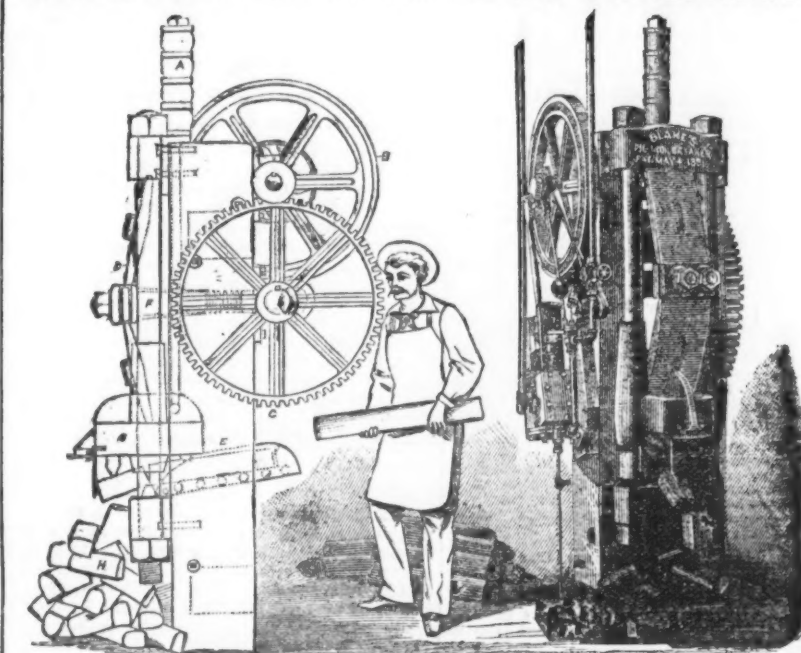
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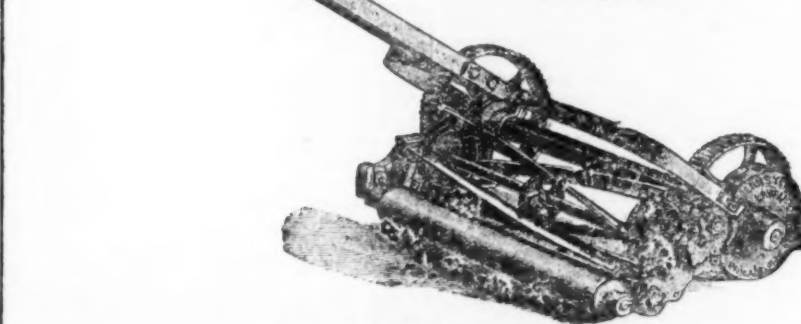
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ing was written quite a panic has ensued, and forced sales have precipitated a decline to 36. The market has now rallied to 37.

EAST INDIES.

(Schmidt, Kustermann & Co.)

PEWANG, March 16, 1882.—Tin.—The market a fortnight ago opened at \$34.50, and then gradually gave way to 33.00, at which latter figure Chinese bought some tin for their country. Subsequently, a recovery took place to \$34.25 per picul, but as there was not enough demand developed to sustain this rate, it finally receded to \$34, at which the last sales were effected. While receipts amounted to 1500 piculs, Europeans took 3500 and Chinese 2400, leaving a stock in bazaar of 2400 piculs. Exchange, 4 months' sight, bank, 3/9 1/2.

(Dummler & Co.)

BATAVIA, March 23, 1882.—As for the general situation here there is, since the Chinese holidays just came to a close, rather more speculative demand for goods at present low prices, though holders do not yet feel inclined to accept the offers made. Stocks of all classes of staples are heavy, but shippers at home may powerfully contribute to steady the market by keeping down supplies as much as possible. The next Biliton Tin sale by the Government will come off on April 28, next, when 13,500 piculs will be offered. In Swedish Iron a moderate business has been done at 10 guilders; damaged bars at auction have fetched 8 guilders. English bars are not in demand. Sheets have realized 7 and 8 guilders. Corrugated Galvanized Sheets brought from 14.25 to 15; English Copper Sheathing has been taken at 66 for assorted numbers; Sheet Lead commands 17 @ 18, and 5/4 and 5/8 Steel 9; Sheet Zinc, 19.50, only 11 guilders being offered for Wire Nail. No 10, 11, 12, 13, 14, 15, and 16 transactions are reported. Exchange, 6 months' private drafts on London, may be quoted 11.95 @ 11.97 1/2.

(Hessener & Co.)

COLOMBO, April 4, 1882.—Pumabago.—American advices being unfavorable, the market is quieter, and we quote, in rupees, 1/2 ton: Fine Lump, 150 @ 160; Ordinary, 115 @ 140; Chip, 70 @ 80; and Dust, 30 @ 35. Shipments to the United States, so far, have been, from October 1 to April 1, 4,797 cwt.; to England, 52,477; to India, 229; and to Australia, 101; together, 90,632, against last year 68,689, 97,171 in 1880, and 40,570 in 1879. Exchange, 6 months' private, 1/16 1/2 rupee.

More Oil Stove Litigation.

During the past few years the oil stove trade has been harassed by suits and threats of suits, to an extent which has done the business great injury, and caused dealers to have a wholesome distrust of everything in the shape of a kerosene burning construction. The thorough and persistent manner in which the trade was worked for royalties and damages under the Fish & Billings patents naturally had this effect, but at last those patents expired and the trade breathed freer, believing that now they would enjoy immunity from harassing persecution, and that hereafter differences between manufacturers would be adjusted by business-like settlements, or by suits among themselves to test patents, which would inflict no inconvenience or pecuniary loss upon dealers. This immunity has lasted but a little while, and now we witness the revival of the same kind of agitation which has worried the trade so much in the past.

Under what is known as the Mitchell patent, dealers are receiving notices of infringement, which, though couched in very courteous terms, and having the form rather of suggestions for the protection of the dealer than of menaces, are none the less disturbing in their influence and hurtful in their effect upon the business. The revival of this sort of thing at this time will do the oil-stove trade greater injury than can be estimated. Many dealers who had vowed they would never touch an oil stove under any circumstances, were just beginning to feel some confidence in the representations of manufacturers. This confidence will be sadly shaken, whether the claims made under the Mitchell patent are sustained or not. It is probable, however, that this last movement will be met in a very different spirit from that inaugurated by the Kerosene Lamp Heater Company. In our advertising columns this week appears the notice of a combination of manufacturers to resist any claims made under the Mitchell patent, and each member of this combination pledges himself to protect his customers against any suits based on the charge of the alleged infringement in any of the goods made by them. Mr. H. McConnell, of the Monitor Oil Stove Co., Cleveland, is now in New York, and has begun suit against the Adams & Westlake Mfg. Co., to restrain the further publication or distribution of circulars menacing suits against dealers selling stoves alleged to infringe the Mitchell patent. The facts in this case are similar to those decided by Judge Wallace in the suit of F. F. Adams Mfg. Co. vs. the Winger Combination, mention of which was made in these columns two weeks ago. In the order granted in that case the defendants, known as the Winger Combination, were restrained from issuing circulars threatening dealers with suits until they had some better basis for such threats than claims made under a patent which had not been adjudged by the courts. Mr. McConnell asks for a like order against the Adams & Westlake Mfg. Co., and we are informed that it is not improbable that heavy suits for damages will be begun against that firm for interfering with the business of those who have not seen fit to license under the Mitchell patent.

The oil-stove trade will doubtless be interested to learn that a movement is now in progress to secure the extension of the Fish & Billings patents. In reply to a letter of inquiry, Mr. John S. Perry has received the following communication from the Clerk of the Patent Committee of the House of Representatives:

HOUSE OF REPRESENTATIVES.
WASHINGTON, D. C., April 27, 1882.

John S. Perry, Esq., Albany, N. Y.—DEAR SIR: Responding to your communication of a recent date to the Chairman of the Committee on Patents, permit me to inform you that on January 11, 1882, Hon. Mr. Brown introduced a petition in the House, from Warren L. Fish, asking an extension of his patent on lamp for sick chamber, which was referred to Hon. C. R. Skinner, of this committee, who, on April 6, 1882, was instructed to report a bill to the house granting the prayer of the petitioner. On January 27, 1882, Mr. Cox introduced a petition from W. B. Billings, asking an extension of his patent, which is also in the hands of Mr. Skinner. Yours respectfully,
C. H. EMERSON, Clerk.

With a view to defeating the effort to secure the extension of these patents, the fol-

lowing circular has been sent to the houses engaged in the oil stove business, which we commend to the attention of the whole trade:

ALBANY, May 7, 1882.

Dear Sir.—You will learn from the foregoing that efforts are being made to obtain from Congress an extension of both the Fish and the Billings patents. Please give us your views as to what action should be taken in the matter, and state what you are willing to do in furtherance of the same. We think it is important that there should be no delay. It is also important that you write to your representative immediately, and secure his active influence against the movement, or, at least, that he request Mr. Skinner to delay any further action until the numerous parties interested have an opportunity of showing the questionable character of these patents.

Address John S. Perry, Albany, N. Y.

Respectfully yours,

PERRY & Co.,

RATBORNE, SARD & Co.

The Fish patent expired July 17th, 1878. It was originally for a nursery lamp, but by clever legal manipulation it was made to appear as if it covered all the essential features of a kerosene stove. This patent was once sustained by a suit, but it is believed by the trade at large that the Kerosene Lamp Heater Company secured judgment by collusion with the defendants.

The Billings patent expired January 17, 1882. It was for a construction of a kerosene stove, and claimed a combination of parts previously used. It was declared invalid in a suit before Judge McKinney in the Western Pennsylvania Circuit. A reissue was then obtained to make the claim stronger and more specific, and in this form it ran for about 18 months, and was never tested. We do not believe that it would, for a moment, have stood judicial investigation. No fact is more clearly established by the ruling of the courts, than that a reissue is vitiated by the addition of any new matter not included in the original claims, or by such remodeling of the original claims as to give them a new meaning not contemplated when the patent was issued. The application for the extension of these patents is doubtless made on the ground that they have not returned the inventors a profit proportionate to their value to the country. We do not believe this claim would stand investigation. If any patents were ever worked for all they were worth these two patents were. It will be seen from the letter of Mr. Emerson, above printed, that some progress has already been made in the direction of securing these extensions, and if the trade are interested in defeating the movement they cannot set about it too soon.

LABOR AND WAGES.

There is but little change in the situation among the miners at Pittsburgh. On May 2d a sheriff's posse arrested 33 of the coal miners of Allegheny, who were sued for conspiracy by Hackett & Rafferty, and brought them to the sheriff's office, where each was required to furnish bail to the amount of \$1000. These men were strikers, it is alleged, and intimidated the men who were engaged to take their places, hence the suit. Several secured bail, but a number were unable to do this, and were sent to jail. There is some talk of the operators along the Panhandle importing colored miners.

The Schuylkill Coal Exchange has just issued the following circular: Pottsville, May 2, 1882.—The following collieries, drawn to return prices of coal sold in April, 1882, to determine rate of wages to be paid in that month, make the following returns:

Reliance Colliery (P. & R. C. and L. Co.) \$2.41
Turkey Run Colliery, " " 2.45
Hammond Colliery, " " 2.48
Big Mile Run Colliery, (J. Taylor & Co.) 2.47
Draper Colliery, (John Milnes) 2.38 1/2 to 100
The average of these prices is \$2.43 82-100ths, and the rate of wages to be paid in April, 1882, is 2 per cent below \$2.50 basis.

For several days past there has been trouble between the local lodges of the Amalgamated Association and the management of the National Rolling Mill, McKeesport, Pa., in regard to the employment of men who are not members of that organization. The association men considered that they were entitled to employ their own members as helpers, but the management had taken several who do not belong to it and cannot be persuaded to join. This was regarded as the entering wedge of a movement by the management to make themselves independent of the association, and was accordingly resisted at the start. A demand was made for the discharge of the objectionable helpers, and when the manager declined to do it a strike was ordered. All the puddlers' helpers quit work, and since that time the mill has been idle and nothing is running except the continuous mill. The company declare that they will not yield to the demand.

The third conference between the manufacturers and employees of the Pittsburgh mills has been postponed until May 22. The first conference between the iron manufacturers and representatives of the Amalgamated Association of the Wheeling district was held last week. The workmen's scales were presented, and without any considerable discussion it was decided to defer the matter until an agreement shall have been reached in Pittsburgh. It is stated on the best authority that the nail-plate rollers will demand 15 cents per ton increase in accordance with the decision of the recent convention of nail plate rollers, held in this city. The heaters will also insist on payment for pile weight. It is believed that the puddlers will make the same demand as those in Pittsburgh made.

The Iron and Metal Exchange will open their suite of rooms in the marble building, No. 60 Wall street, next Tuesday. The general appearance is airy and commodious, but without metrical display of any kind. The desks, tables, chairs, furniture of every kind, are in ash and chestnut, corresponding in tint with the floor of varnished pine. The institution is progressing in membership, there being now some 150 names, counting firms as individuals, while probably twice that number of persons are entitled to the privileges of the floor.

Mexican Iron Works.

The Journal of Charcoal Iron Workers contains an interesting description of the Piedra Azul Iron Works, in Mexico, from which we quote as follows:

The plant consists of a blast furnace 35 feet by 8 feet, a heating furnace, a puddling furnace, one train of rolls, two sinking fires, one wooden helve hammer and three smith fires. Power is obtained from a masonry dam across the Rio Tunal, giving a head and fall of 17 feet. There are four water-wheels—two over-shot, one under-shot and one turbine. The blast furnace is built of stone. The bottom of the crucible is 24 inches square; the top, which is 5 feet 6 inches higher, is 32 inches square. The bosh then slopes, at an angle of 55° from the vertical, to 96 inches diameter. The crucible and the bosh are built of sandstone, brought by wagons 200 miles. The shaft of the furnace is constructed of a silica fire-brick, made from clay and crushed quartz. It runs nearly straight for the first 10 feet above the bosh, and is then drawn in by curved lines to the open top, 32 inches in diameter.

Blast is delivered cold from two 2 1/2-inch open tuyeres, the air being supplied by two iron blast cylinders, 60 inches diameter and 5 feet stroke, placed horizontally, and operated by an over-shot wheel. The charge is raised by hand winch, on an inclined plane, to the tunnel head, and consists of one buggy of oak charcoal, seven to ten "battes" of ore, two battes of a rotten limestone, and half a batte of clay. These battes are wooden dishes, and each contains two arrovas (50 pounds of ore). The charge may, therefore, be considered at from 350 to 500 pounds ore, 50 pounds limestone, 15 pounds clay to 20 bushels of charcoal. The average daily product of the furnace is 60 quintals (6000 pounds) pig iron, the ore yielding 60 per cent in the furnace, and requiring 1 1/4 quintals of charcoal to 1 of iron = 175 bushels of 20 pounds to 1 ton (2000 pounds) of pig iron.

Connected with the furnace plant there is a puddling furnace and a heating furnace, in both of which pine wood is used for fuel. There are also two sinking fires, in which pig iron and scrap can be converted into blooms. A short wooden helve trip hammer, raised by four cams on a wheel revolving at right angles to the hammer helve, is used for jangling the loupes and puddle balls. The cams strike the helve back of the hammer head, and a spring piece assists in intensifying the force of the blow. The smith fires use pine charcoal for fuel. The charcoal is made in the Sierra Madre mountains in small heaps, by Indians, and most of it is brought in on the backs of burros. As these animals carry only 8 to 10 arrovas (200 to 250 pounds), and in some instances can make but a trip to and from the iron works in three days, it is not surprising that oak charcoal sells at 12 1/2 cents and pine charcoal at 15 cents per arrova. Reduced to a bushel of 20 pounds, this would equal 10 cents for oak and 12 cents for pine charcoal. Although the coal is bought by weight, it is charged by measure, a buggy full approximating 20 bushels. The charcoal is of good quality, but much reduced in size by handling and transportation. The price of the charcoal could be considerably reduced if the iron works produced its own fuel from wood more convenient to it.

Skylight Litigation.

In the equity suit of George Hayes vs. John Seton, in the United States Circuit Court, Eastern District of New York, which was brought on five reissued letters patent, was recently decided by Judge Benedict adversely to the plaintiff. The opinion of the Court is too long to be quoted in full, but in brief the decision is founded upon a declared difference between the reissued patents and the originals. The opinion sets forth that the reissued patent No. 8597 for ventilators, covers an invention different from that described in the original, and for that reason void. The reissued patent No. 8674 is for a rafter of sheet iron having ledges for the glass and gutter beneath the same. The claims alleged to have been infringed are held to be for matters and combinations not claimed in the original patent of which this is a reissue, and is void, the reissue being for a different invention than that claimed in the original. The reissue patent No. 8675 being for an improvement upon the outer rafters of the patent last referred to is held to be void, if constructed so broadly as to embrace any of the devices within the claims said to be infringed. The reissued patent No. 8683 being for another form of rafter, is held to be void as to all the claims alleged to be infringed by the defendants, which are for different inventions from those of the original. The reissued patent No. 8689, being for a swinging turret sash, is held not to be infringed by the structures of the defendant. We understand that Judge Benedict, in his legal conclusions as to the validity of the reissues, is guided by a very recent decision of the Supreme Court in Miller vs. the Bridgeport Brass Co., and that this is not an end in this litigation. The plaintiff proposes to carry the case up, and this decision in due time will be reviewed.

Testimonial to Capt. Wm. R. Jones.—Capt Wm. R. Jones, General Superintendent of the Edgar Thomson Steel Works, sailed for Europe on the 9th inst. He will visit all the manufacturing centers of England, France, Germany and Belgium. Before leaving the works on Saturday he was invited into the chief clerk's office to sign the monthly pay-roll, and while thus engaged all the assistant superintendents and foremen of the works assembled at the office. Mr. Harry C. Teeter, of the clerical force, presented, on behalf of the assembled workmen, an elegant pair of field glasses, in an eloquent and fitting manner. Mr. Jones responded in a few remarks, thanking the men of the steel works for their uniform courtesy during his life among them, and for their hearty good will and esteem in his departure. Mr. John Renard then stepped forward and presented Captain Jones an elegant silver snuff-box, and scarcely had this been done when Mr. Julian Kennedy came to the front with a handsome traveler's companion, which he presented with appropriate remarks. The relations between Captain Jones and his men have always been characterized

by good feeling on both sides. He leaves regretted by all. Captain Jones is a remarkable man, and has every quality calculated to make him a successful and popular manager.

South Australian Coal Deposits.

Important coal discoveries are said to have been made in South Australia, reports from the alleged coal district stating that the vein crops out of a cave, being only 6 inches wide at its extreme end, but soon assuming more formidable dimensions. The discovery was made through a man noticing drippings from the wall of a resinous substance, which, on analysis, was found to contain several ingredients denoting the presence of coal. A quantity of the supposed coal was tested in the following way: A shovel was heated red hot and a small piece of the material dropped on it, together with a piece of English coal. The English coal fired rapidly, while the other simply smoked and smoldered away. This being the case the shovel was heated still more, and the substance being put on it burned readily with a bright flame, giving off great quantities of smoke of the color peculiar to coal, the fumes also bearing the smell. Applications for the lease of upward of 80,000 acres have been made for the coal field. Extensive arrangements have also been made for testing an alleged coal deposit in another part of the country, and a depth of 90 feet has been reached; at present further preparations are being made for a diamond drill to reach an additional depth of 100 feet.

Pase Ball.—In a game of base ball played on Saturday, April 29th, on Elysian Fields, between the Independents, of Alfred Field & Co.'s, and the Resolutes, of H. B. Newhall, the former won by the following score:

Independents.....	1	2	3	4	5
Resolutes.....	8	6	12	7	33
.....	2	3	3	4	3-15

The Independents are open for engagements in the hardware trade. Address all communications to Alex. Burgess, captain of the Independent nine, of Alfred Field & Co.

There is a muddle at Chicago on the subject of electric lighting. The fire department's opposition is a great factor in the trouble. The firemen are afraid the insulation might be cracked or melted away in a fire, or be imperfect before the fire even, so that when they go to work they would be in danger of being instantly killed. There are many ways in which the wires might be broken or forced down on other wires and injury done. The firemen want the electric wires underground.

It is reported that Du Puy's method of obtaining soft iron directly from the ore will be introduced into Spain at no distant date, and it is expected that its introduction will be of great advantage to the iron industries of the Peninsula, and that it will successfully supplant the old and laborious method of hand puddling.

It is announced that Krupp has secured large contracts for steel rails for English railways. The rails are to be sent in vessels from Essen to Hull.

The shrinkage of Lake Constance, in Switzerland, owing to the extraordinary dryness of the past winter, has brought to light many highly interesting relics. The Geneva correspondent of the London Times says that among them there are bone and flint implements, harpoons, pottery, many specimens of which are intact; clubs, baskets, arrows, field tools, and animal remains. Among the latter are skeletons and part skeletons of the bear, the bison and the moor hen. The find also includes a considerable quantity of oats and wheat in a good state of preservation, and a remarkably perfect and artistically executed stag-horn harpoon. The relics have all been removed to Frauenfeld and added to the collection of the local historical and natural history society, which is now the richest in lacustrine objects in the Confederation.

St. Louis is fast coming to the front as the great cotton mart of the interior. Among inland cities she stands foremost, Houston, Texas, alone excepted. Her business increased from 60,000 bales in 1874 to 480,000 bales in 1880. More than \$1,250,000 have been expended by her citizens for cotton compress establishments, and the new Cotton Exchange just opened cost \$100,000.

President Arthur has signed the Chinese exclusion bill. He was pressed contrary to his judgment. In its modified shape the immigration of Chinese is suspended for 10 years instead of 20, but the essential features of the original, in other respects, remain unchanged.

Mr. William Kent has resigned his connection with the business of Schoenberger & Co., Pittsburgh, and has sailed for Europe on a short trip, for rest and recreation. On his return he will probably establish himself in Pittsburgh in a line of business for which his training and tastes peculiarly fit him.

The tunnel at Montreal now under contract will be 16,000 feet in length, and be laid with a double track. The center will be about 76 feet below the level of the bank on either side. The cost is estimated at \$4,000,000.

A Sydney dispatch of April 12 says: Fencing wire continues to sell freely, and values have improved, present quotation for No. 8 gauge being £13. 17/6, a rise of 2/6.

Glengarnock and Carnbroe SCOTCH PIG IRON.

For spot delivery and for prompt or forward shipments to New York, Boston, Philadelphia, Baltimore or New Orleans.

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Sheet Iron Pipe & Elbows,
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Etc., Etc.

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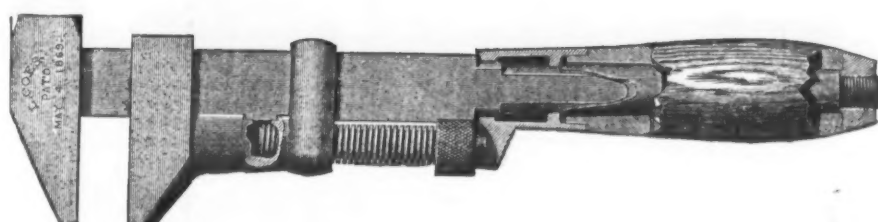
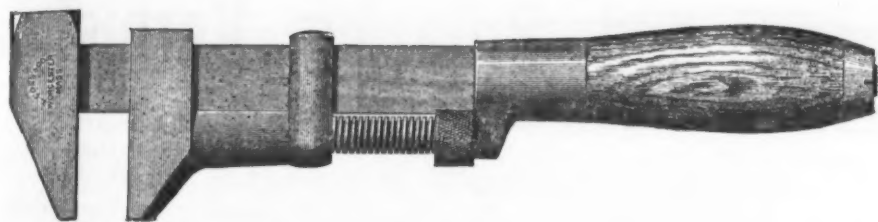
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ESTABLISHED 1839.



We discarded the old Nut attachment nearly two years ago and applied the better device we are now using (covered by patent) for preventing the back thrust of the ferrule. The superiority of this invention over all others has been fully established by practical test. By reference to above cut (sectional view) our improved method will be readily understood.

We make the shank of our wrench about double the size of those in other screw wrenches, leaving it full size, and strength by not cutting a thread.

Our Ferrules are made with two bearings, both fitting the shank.

An Iron Tube of sufficient strength to resist any pressure that may be put upon it, is fitted to the shank, one end resting against the lower bearing in the ferrule, the other against the enlarged Tip or Nut at end of handle, all rigidly held in position, the wooden handle made to fit exactly over the Iron Tube, forming a solid combination of Wood and Iron, preventing any possible displacement of the ferrule from hard usage. All our Wrenches are made with straight Bar, full size, the extreme length. The Jaw is made with ribs on the inside, running full length of the Jaw, which, in connection with the projecting sides, both secured by patent, are fully equal to any strain the Bar may be subjected to. We have also enlarged the barrel of the Jaw to take a larger and longer screw, enabling our Wrench to accommodate a larger Nut than any other manufactured. We make our goods of the very best material, thoroughly case-harden, and warrant every Wrench.

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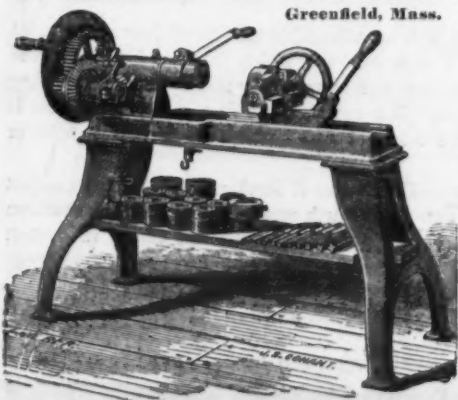
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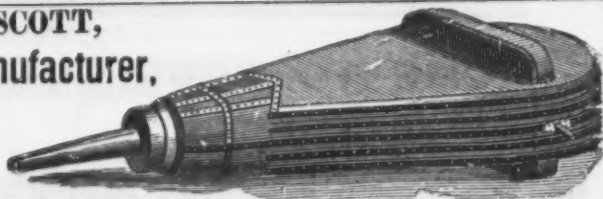
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Bolt Cutters for Hand or Power.
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Green River Drills, hand or power.
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" Upsetter's.
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Cast with perfect seamless thread by new patent process.
Much cheaper than wrought iron and warranted to stand more pressure.
Liberal discount to the trade.
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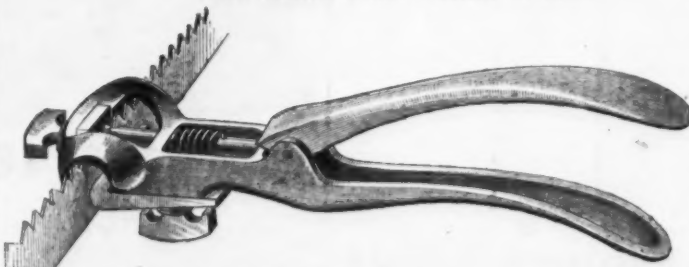
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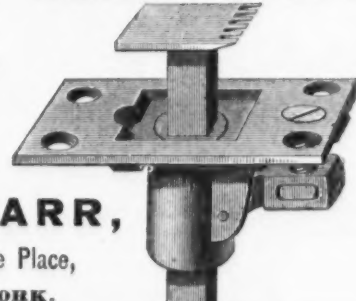
The best Key Ring in the market. Manufactured from the best steel and warranted not to break.
EVERY RING GUARANTEED.
Manufactured exclusively by
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Orders from the trade solicited. Prices furnished on application. Samples furnished free by mail for 15 cts.

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Economy Combined with Ornament and Durability.
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Directions.—To fill the cylinder, push the latch-bar from one of the uprights—it will swing out like a gate—slip the cylinder off to fill it with matches. To get a match, revolve the cylinder slow and let it rest on the top center and let go, a match will be found on the bar.
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CAPACITY 1 A TON A MINUTE.
DON'T FORGET IT
Guaranteed to do Double the Work of any other or Money Refunded.

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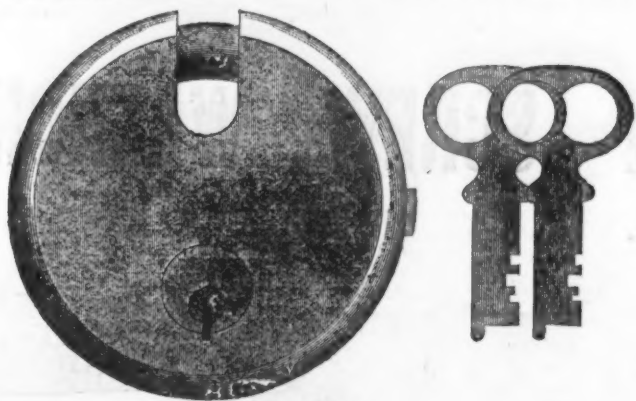
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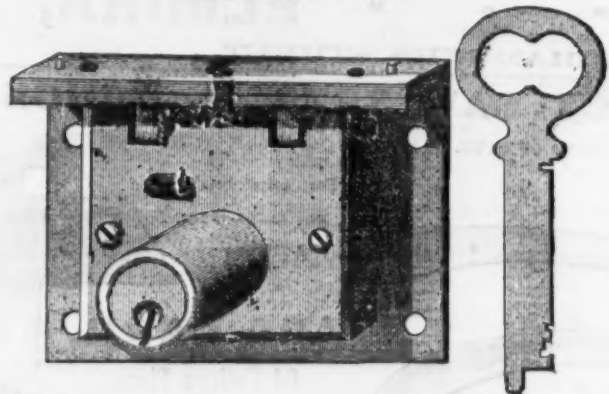
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It is made of wrought brass, and is furnished either brass or nickel-plated. It is novel in its construction, perfect in its operation and very secure. It is locked by a slight pressure on the projection shown on the right side of the cut.

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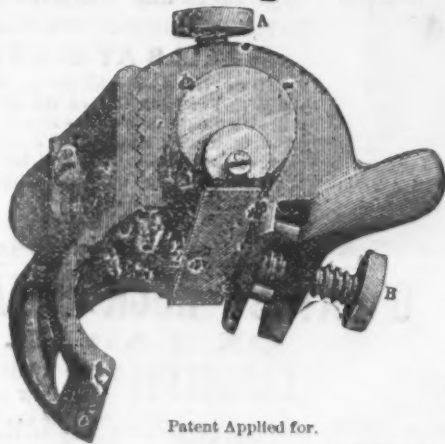
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CLEVELAND, OHIO.FINE BRONZE DOOR LOCKS, KNOBS
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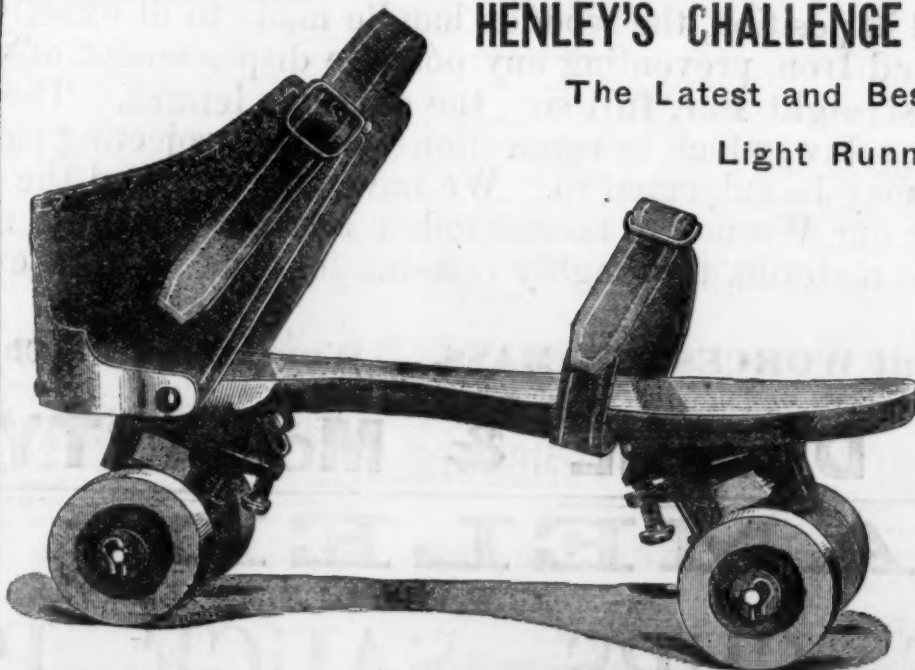
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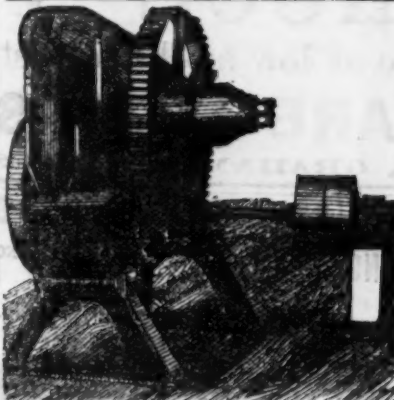
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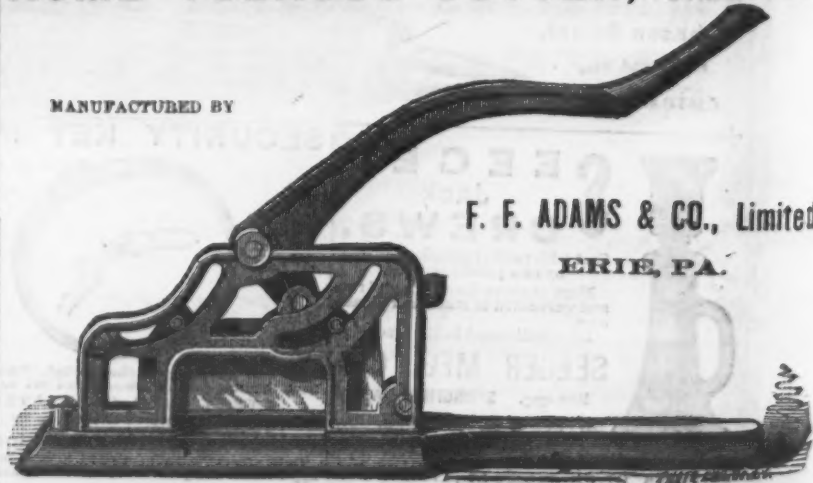
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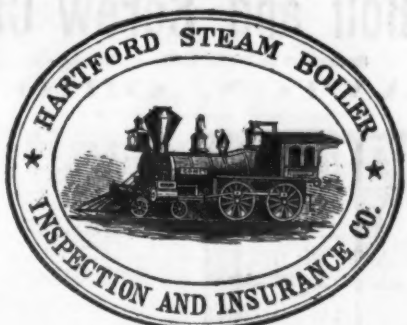
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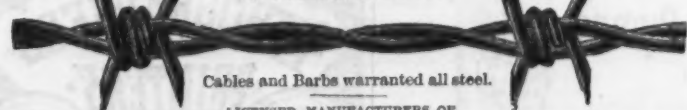


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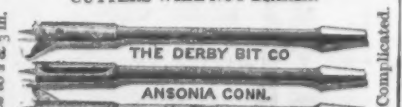
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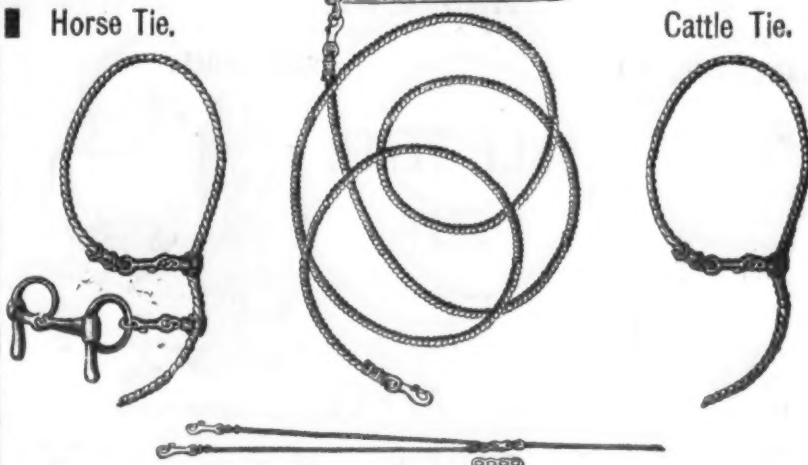
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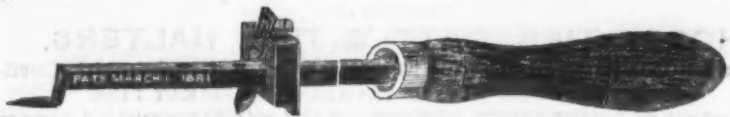
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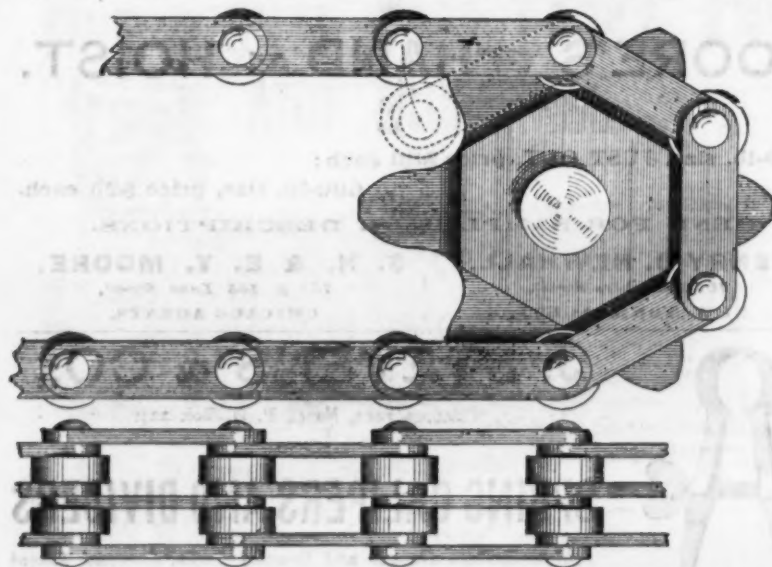
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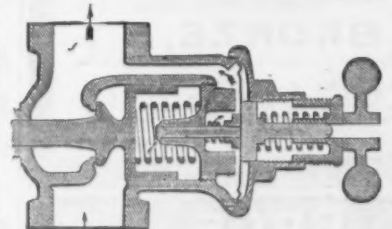
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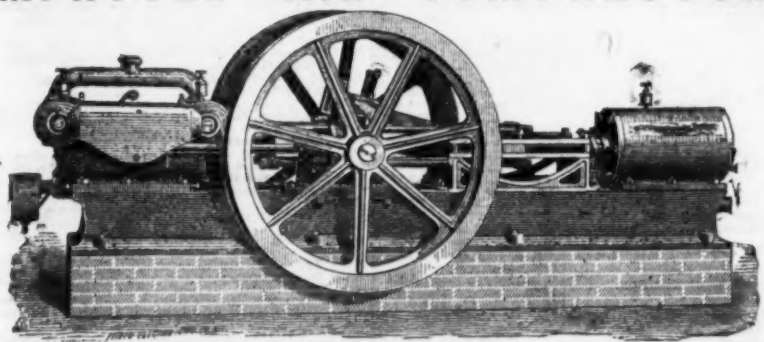
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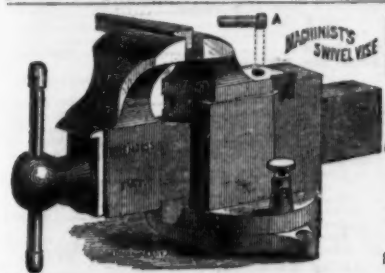
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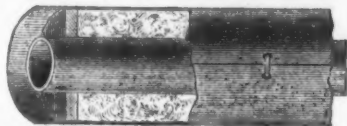
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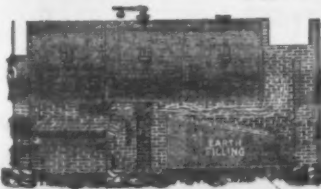
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MAY 20, JUNE 17, JULY 6, AUGUST 5, SEPTEMBER 2 and 30, OCTOBER 28, NOVEMBER 25, DECEMBER 23, 1882, JANUARY 20, FEBRUARY 17, March 10, APRIL 7 and MAY 5, 1883.

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of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the Ironmonger not only within reach but in the native language of eighty millions of Germans, forty-two millions of French, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or, in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

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THE WHOLE FOREIGN HARDWARE TRADE

so far as our experience of twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertisement inserted in the Ironmonger and Foreign Supplement is a strikingly powerful and most efficient way of publicity not to be compared with any of the other ordinary channels of communication.

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Fig. 1.

Patented May 29, 1879.

Fig. 2.



Price, - - - \$37.50 per dozen.

No Farmer, Nurseryman, Railroad
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SHOULD BE WITHOUT ONE.

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This tool has been thoroughly tested, and has given the greatest satisfaction to all who have tried it. The principle on which it works makes it self-cleaning and prevents adhesion in sticky soil; therefore it always works free and easy. It is far superior to all plungers, augers and boring machines, as it works well in stony, sandy, or clay soils; quicksand under water is as easily removed as though no water existed.

DIRECTIONS.

Plunge the Digger into the ground, as shown in cut, Fig. 1, and when the soil is loosened pull out the lever with one hand, as shown in cut, Fig. 2, which will press the dirt between the blades; then draw the Digger from the hole, keeping hold of the lever with one hand and the handle with the other. When the Digger is clear of the hole, you can deposit the load anywhere within reach by simply pressing down the lever, which will open the blades and the dirt will fall from between them. The Digger is then ready for another plunge. The steel blades are nine inches long, and the whole tool five feet long. For sale at Hardware and Agricultural Stores.

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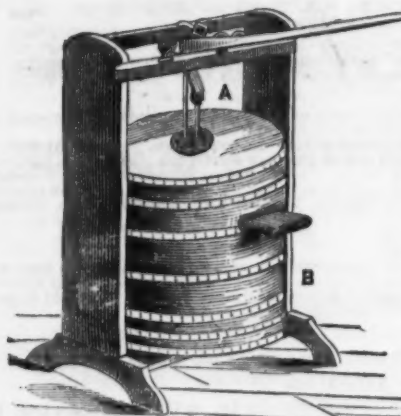
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SUPERIOR TO ANY.

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DRILLS FOR COES, WORCESTER, HUNTER AND OTHER HAND DRILL
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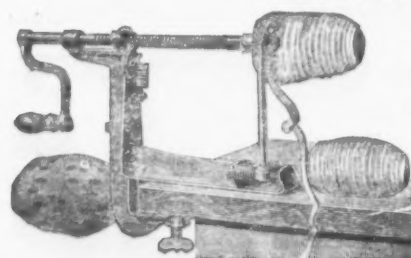
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The White Mountain Potato Parer is the only machine ever made that will not only pare a potato much better than it can be done by hand, taking off a thinner paring from every shape or kind of potato, but will go into and clean out the eyes, and altogether at a saving of at least 20 per cent. It is free from the objections made to the old style of rattletrap, geared parers; is solid and substantial, cannot get out of order, and so cheap as to be within the means of everybody.

Almost any of the Potato Parers in the market seem as if they might do the work better "next time," but the "White Mountain" DOES IT NOW. Every Machine warranted as represented.

Price to the Trade, \$7.50 per dozen.

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The Most Durable and Best Selling Bucket for Chain Pumps.

It has no valves to become obstructed and no screw joints to become immovable by rust.

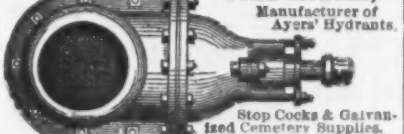
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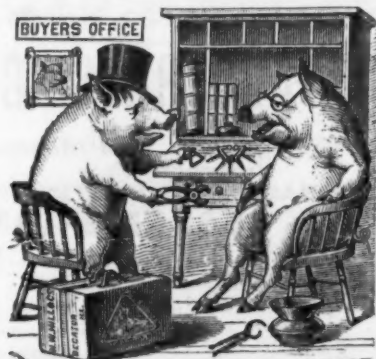
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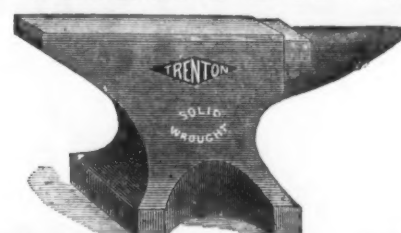
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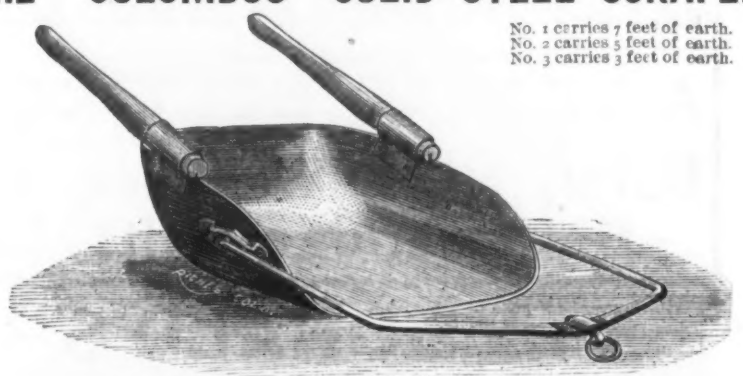
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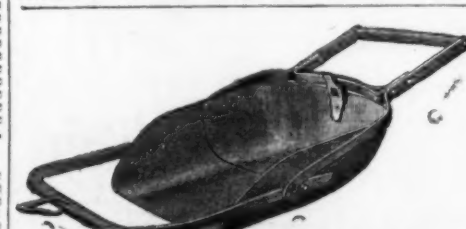
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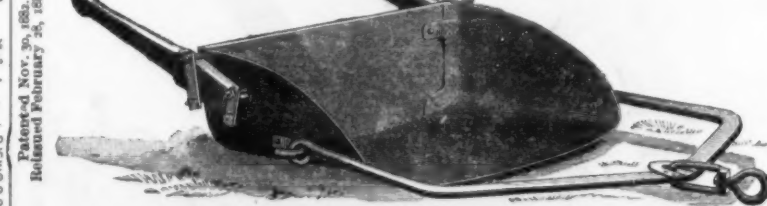


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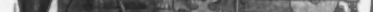
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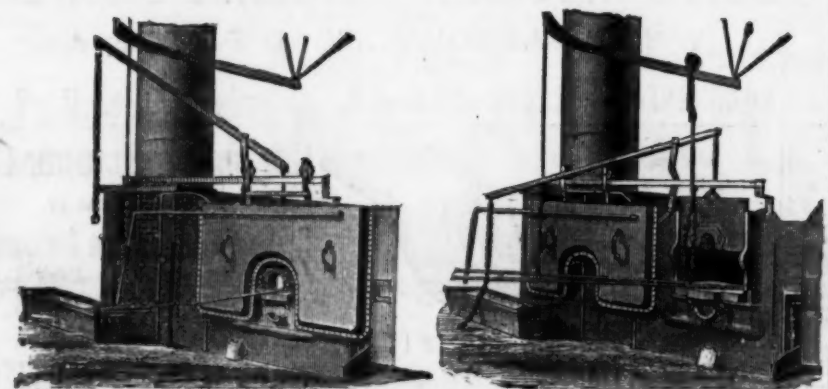
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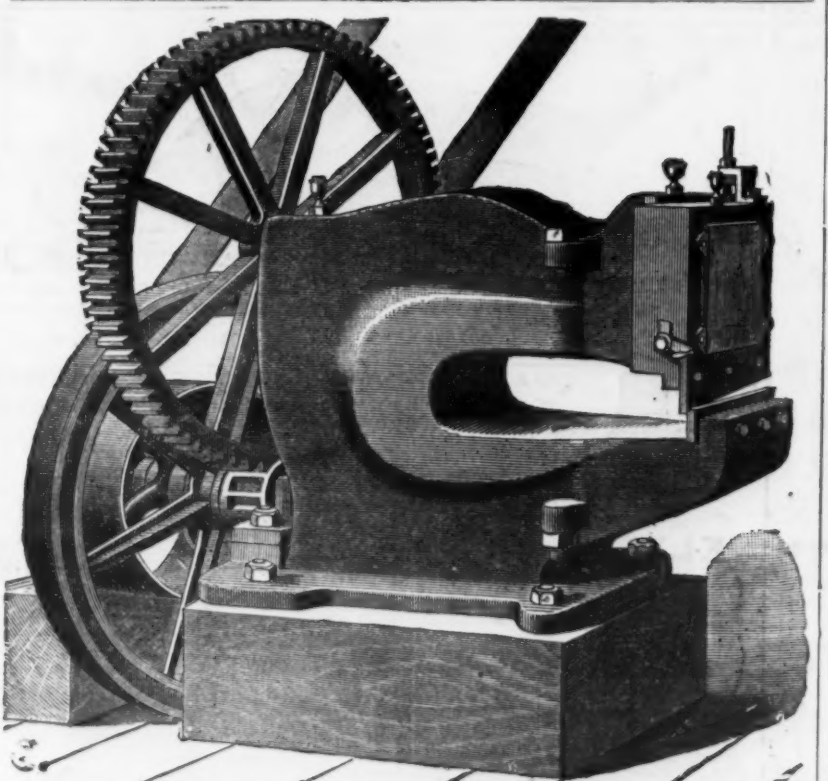
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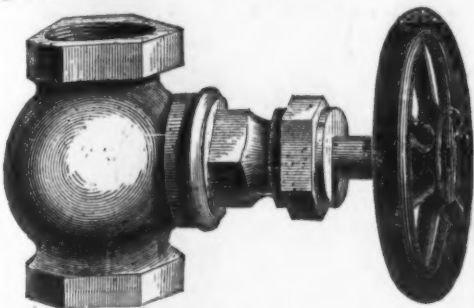
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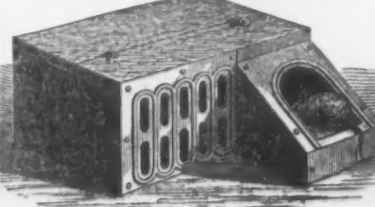
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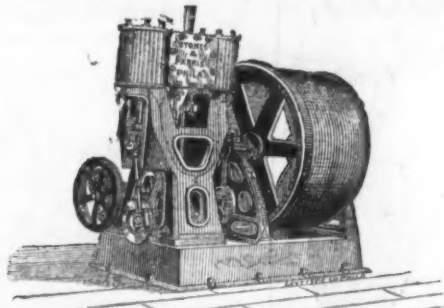
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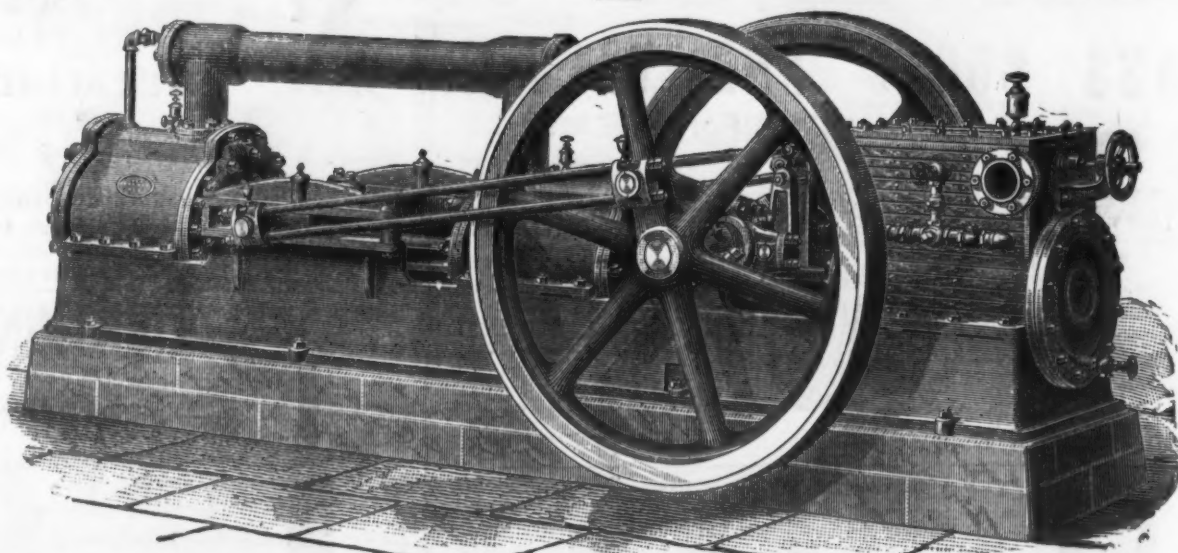
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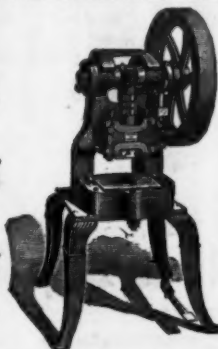


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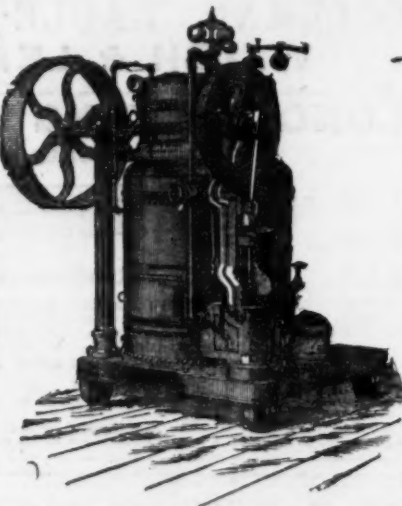
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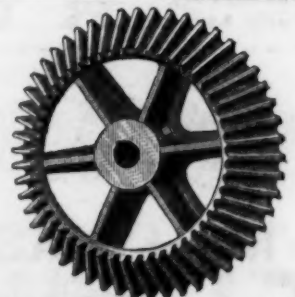
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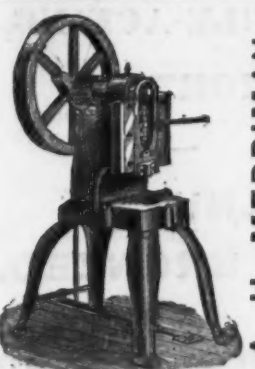
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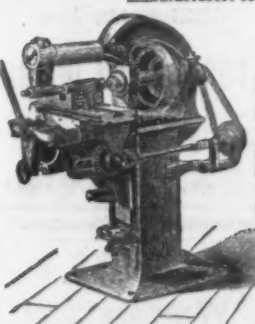
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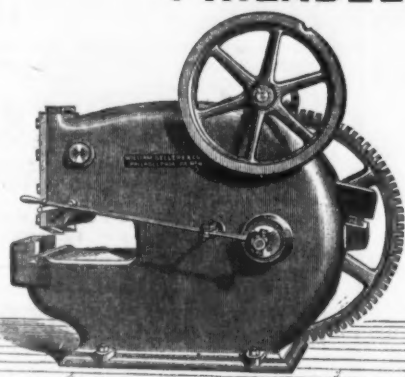
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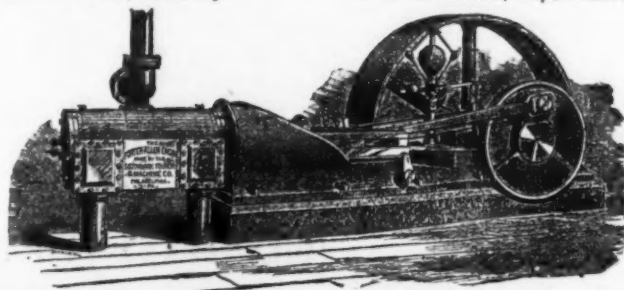
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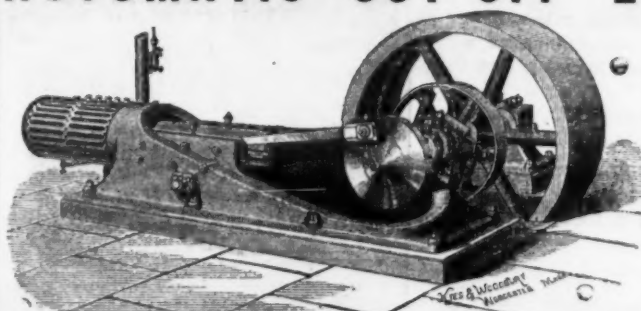
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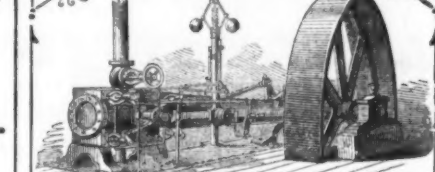
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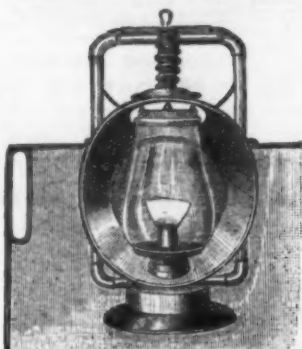
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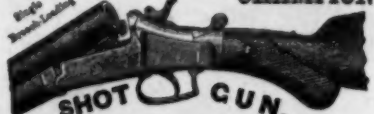
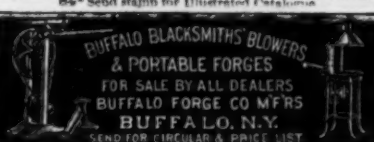
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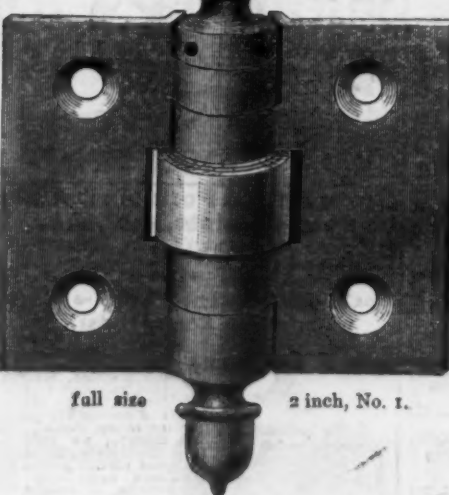
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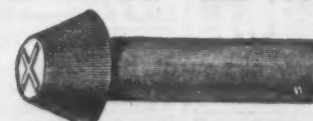
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